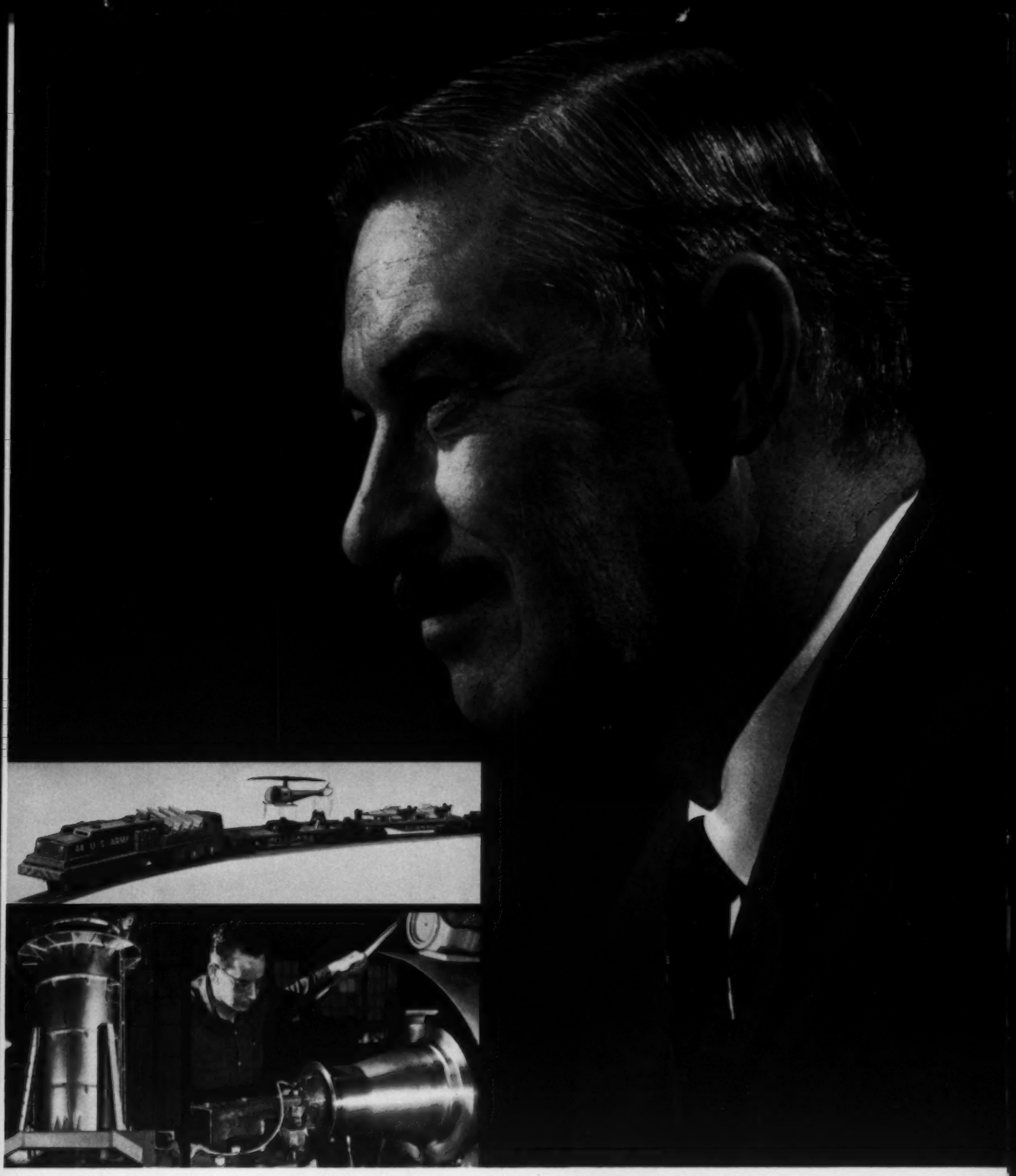
STEEL
The Metalworking Weekly
A PENTON PUBLICATION
JUNE 5, 1961



Major General Medaris, former Army missile expert, commands new post as . . .

Lionel Highballs to New Markets 40

How '61 Labor Contracts Shape Up . . . 37

PROGRAM FOR MANAGEMENT **Campaign for Profit Growth 47**

Precision Balancing Gets Bigger Role . . 82

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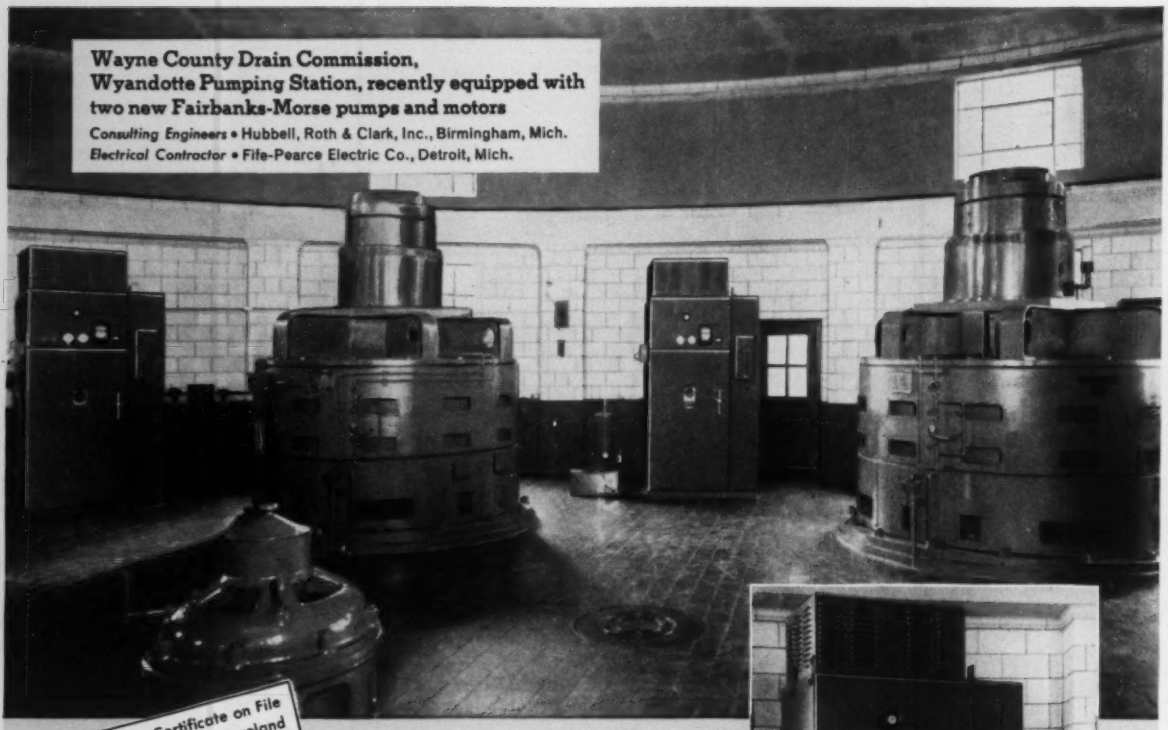

Wayne County Drain Commission, Wyandotte Pumping Station, recently equipped with two new Fairbanks-Morse pumps and motors

Consulting Engineers • Hubbell, Roth & Clark, Inc., Birmingham, Mich.
Electrical Contractor • Fite-Pearce Electric Co., Detroit, Mich.

Certificate on File in Cleveland

Certified Fault Protection WITHOUT FUSES!

EC&M Fuseless Starters

ELIMINATE FUSE PROBLEMS & COSTS

Now you can get full fault protection without the problems associated with fuses. EC&M's fuseless starters have certified interrupting capacities of 100,000 KVA at 2400 volts, 150,000 KVA at 4800 volts — an important consideration when starters were selected for the 1250-hp, 4800-volt starters at Wyandotte Pumping Station. This inherent fault protection is an EC&M "exclusive" — and is available with no first-cost premium.

EC&M starters are safe and easy to maintain. A three-way door interlock gives positive personnel protection, and an interlock is provided between the contactor and disconnect switch. Disconnect blades are visible in the open position when the door is open. No roll-out or draw-out needed for maintenance. All six contacts can be replaced without special tools in 10 minutes or so.

These cost-saving features make EC&M starters the logical choice for 2200-4800 volt motor drives.

TYPICAL SAVINGS WITH EC&M STARTERS

	Fused Starter	EC&M Fuseless Starter
Cost of 1250-hp 4800-volt Starter	$xxx.xx	Same as Fused Starter
Spare Fuse Costs: Set of 3 Spare Fuses for 1250 hp	$470.00	0

***SAVE** per starter, up to $500*
(more on larger motors)
...with EC&M Fuseless Starters

***Write** FOR DETAILS • Ask for Bulletin 8130*
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wherever electricity is distributed and controlled

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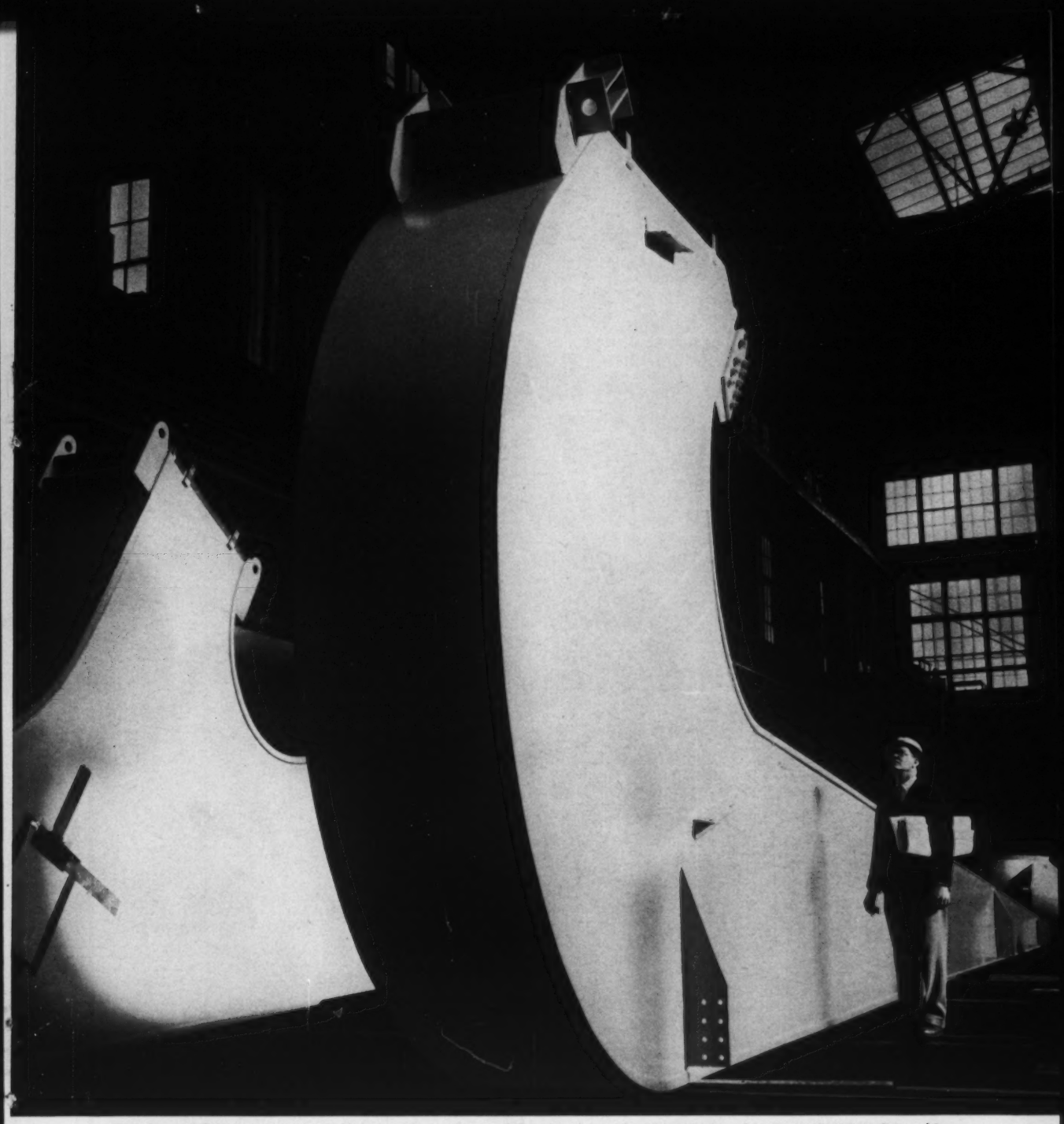

Bethlehem steel plate was used in all 66 frames. Owner: District of Columbia Armory Board; architects and engineers: Dahl-Ewin-Osborn (George L. Dahl, Dallas; Ewin Engineering Associates, Wash., D. C., the Osborn Company, Cleveland; associated for this project); builders: McCloskey & Co.

Husky steel-plate frames for circular stadium

The new double-decked stadium now under construction in Washington, D.C., will provide both the Senators and Redskins fans with spacious and modern facilities. More than 2,800 tons of Bethlehem steel plate (ASTM A-373) were used to build the huge steel supports that ring the stadium.

These supports have two arms: one, 80 ft long, supports the seats; the other, 70 ft long, provides a cantilevered support for the roof. Plate thicknesses range from $\frac{5}{8}$ in. to $1\frac{3}{4}$ in.

Bethlehem plates are available in a full range of sheared and universal mill sizes. Their uniform quality makes them ideal for fabrication of any type or size. For full details, call the nearest Bethlehem sales office.

Steel

For strength
. . . economy
. . . versatility

Bethlehem Steel Company, Bethlehem, Pa. *Export Sales:* Bethlehem Steel Export Corporation

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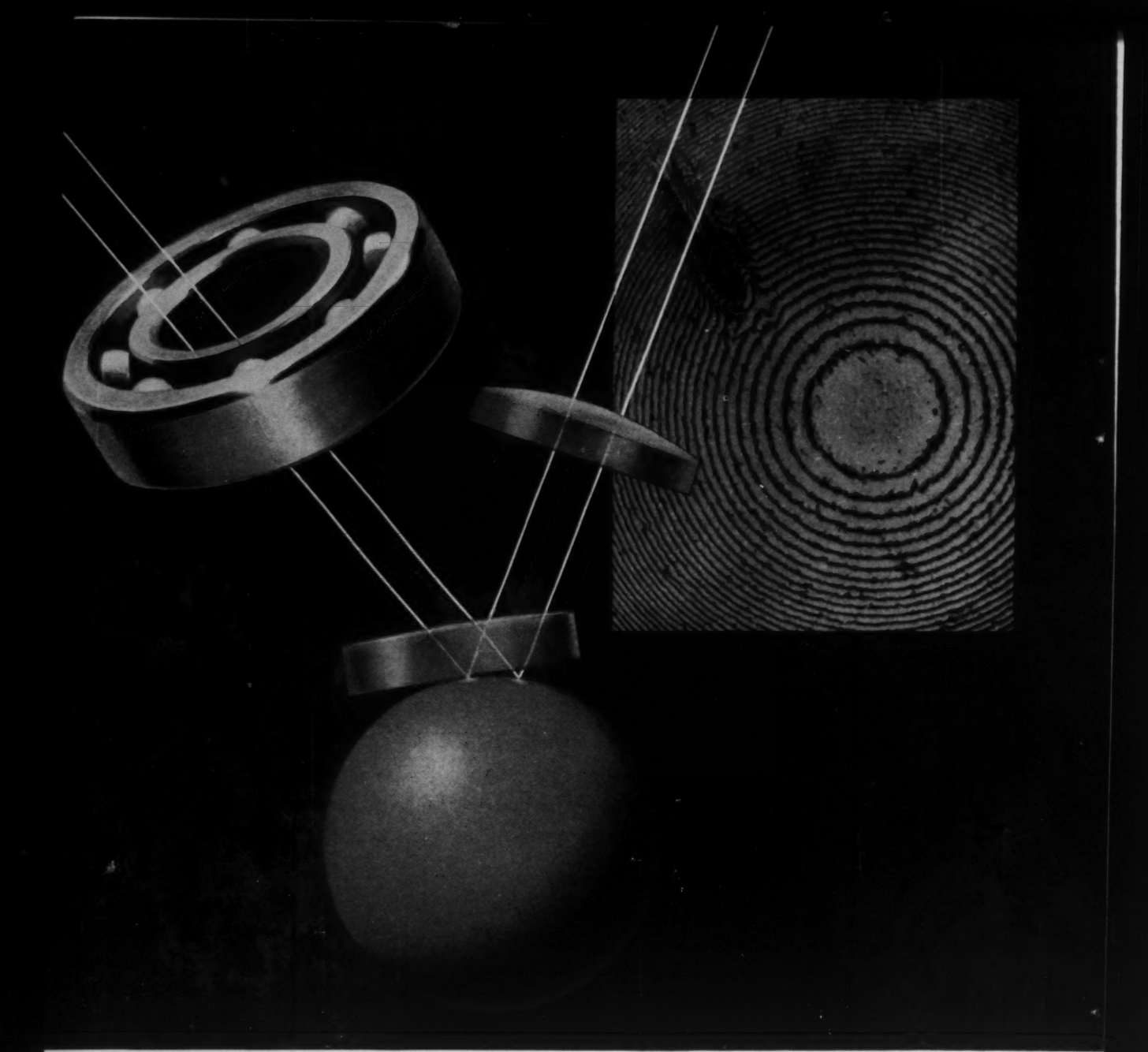


SPLIT LIGHT BEAMS MEASURE IN MILLIONTHS

to help SKF build better bearings

SKF MOTION ENGINEERING

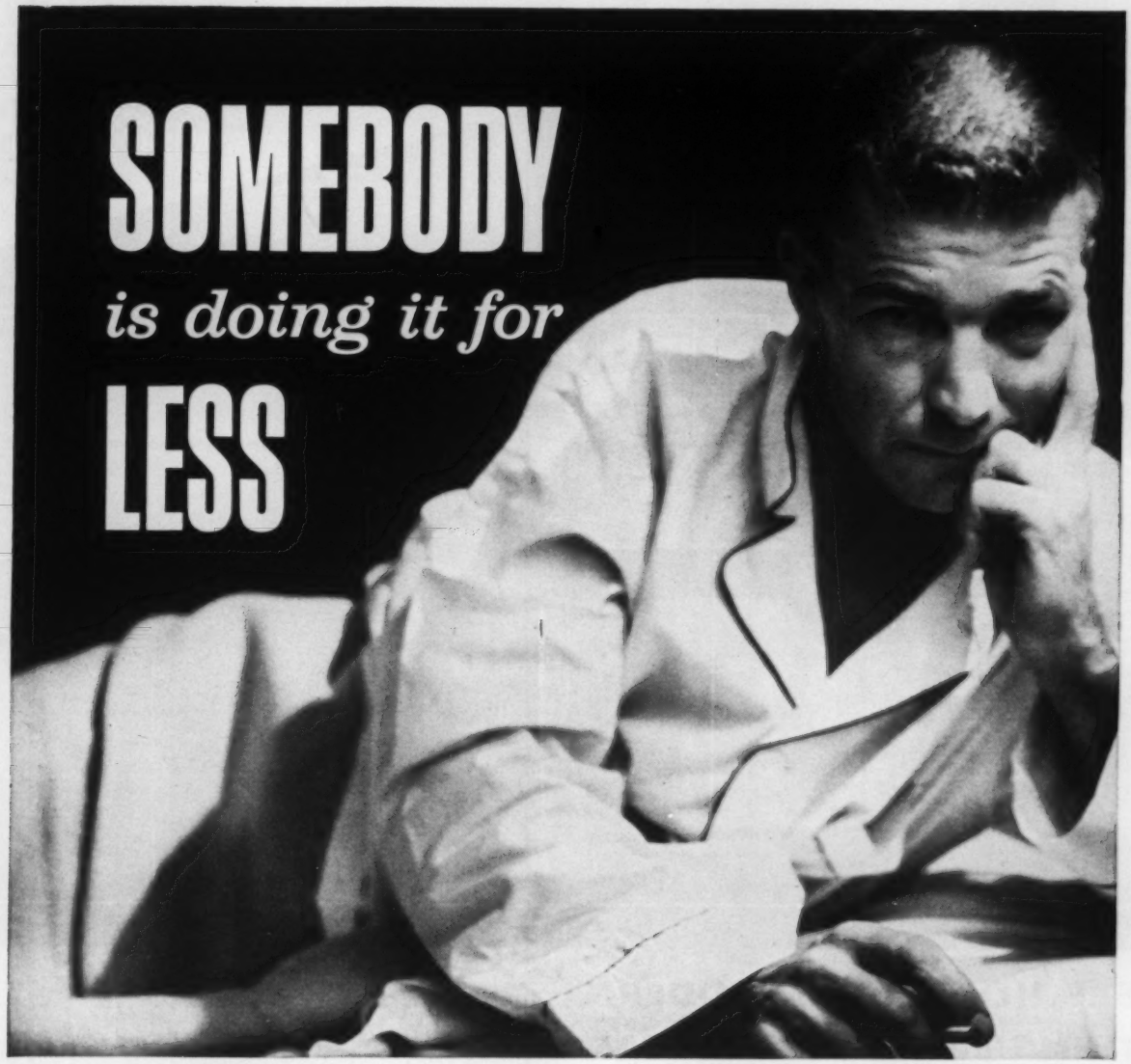
Advanced ball and roller bearing technology

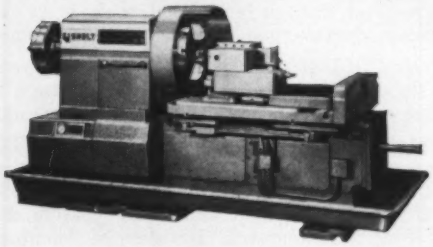
The concentric pattern of interference fringes in the picture above is reproduced from an actual photo taken with the aid of an interferometer in the SKF laboratories. The subject under examination is a microscopic flaw in the surface of an accurately lapped steel ball. The principle of utilizing split beams of light to form interference patterns enables accurate measurements to be made in *millionths* of an inch.

SKF is a leader in the development and application of ultra-precise measuring systems. The SKF metrology laboratory plays an important part in a continuing program of research to produce bearings of improved accuracy and finish, and consequently, quieter, smoother running characteristics.

Whatever types of rolling contact bearings you need—ball, cylindrical roller, spherical roller, tapered roller or precision miniature—you'll find SKF your best assurance of dependable performance. SKF Industries Inc., Philadelphia 32, Pa. 6104

SOMEBODY *is doing it for* LESS





MASTERLINE® SIMPLIMATIC Automatic Chucking Lathe — Here's the essence of the "building block" principle: standard headstock and wide, screw-fed platen; standard front, center, rear or auxiliary slides with tool blocks—positioned to handle maximum surfaces per chucking. Literally, there's no end to *your* opportunities for saving.

Ask your Gisholt Representative or write for Catalog 1159-C.

If you have special machining jobs, you, too, may be in line for some substantial savings.

With recent developments in Gisholt Automatic Chuckers, many so-called "special" jobs are no longer being done on special machines.

Don't *you* buy that "special" before you investigate the Gisholt Simplimatic.® You may save money and precious lead time with the flexibility this standard lathe offers.

If your jobs include rings, discs, flywheels, sheaves, bevel gears, motor frames or housings, you, too, can do it for less.

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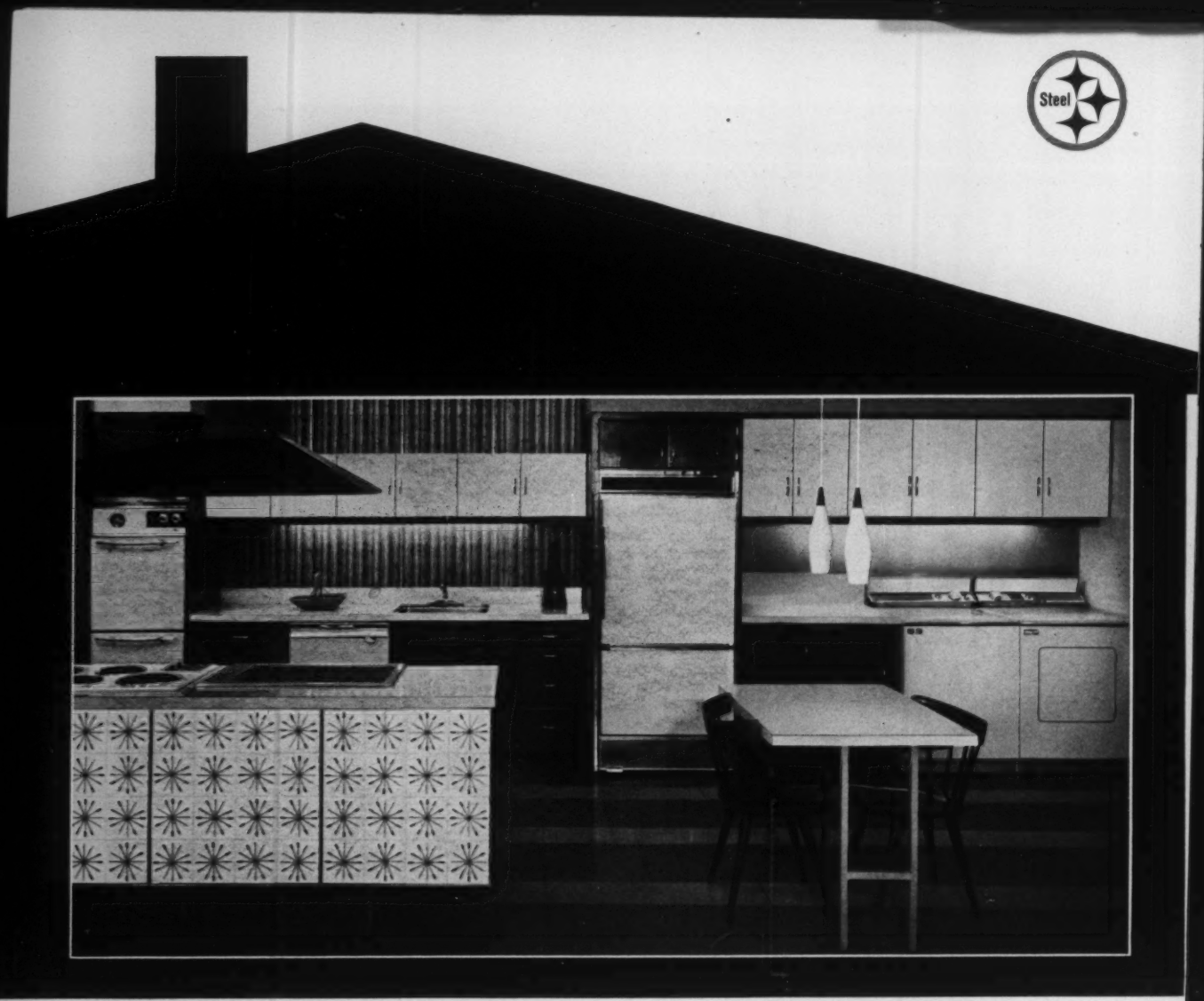

SEE HOW MANY MODERN THINGS THESE STEELS CAN DO FOR YOUR APPLIANCES

When you choose steel for your kitchen appliance line, yours is a product that's all things to all customers—whether they're quality-minded, budget-minded or beauty-minded. In fact, about the only thing that can equal steel's sales appeal is its advantage, economically, to you. Case in point: the modern steels of Weirton Steel Company.

TAKE WEIRKOTE®, FOR INSTANCE—and dispense with the extra costs of anti-corrosion coating operations. Weirkote galvanized steel offers you heavy-duty corrosion resistance, economical flake-free, peel-free fabrication and an advantageously low expansion-contraction rate. The latter gives Weirkote a vital edge over lighter metals—namely, an edge that stays put at the seams, despite the temperature changes that occur in stoves, freezers, refrigerators, washers and dryers. (Weirkote is also available from National Steel's Midwest Steel division.)

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OR PRE-PAINTED OR VINYL-COATED WEIRTON STEELS—Factory pre-painting of Weirkote and Weirzin or cold-rolled steel offers you built-in economy, controlled quality and any shade you might want. Vinyl coating, done by National Steel's Enamelstrip Division of Allentown, Pennsylvania, can be ordered in almost any texture and color. Any Weirton Steel goes through all production steps flawlessly and economically.

TAKE MODERN STEEL—particularly in any of the forms mentioned above. For full details, write Weirton Steel Company, Weirton, West Virginia.

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Weirton, West Virginia

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Editor Abroad

Editor Walt Campbell (left) confers here with Dr. Heinz Nordhoff, president of Volkswagen. He was gathering material for a story on the company. The result begins on Page 42.

Dr. Nordhoff told Walt that Volkswagen is about as international as any auto company can get, buying materials, tools, and equipment from many nations, including the U. S., and marketing the vehicle in 118 countries.

Incidental Intelligence

Item: Associated Industries of Cleveland reports that 5.9 per cent of the companies it queried will allow paid time off on Monday, July 3, before Independence Day; 92.8 per cent will not; the rest are undecided. Of those that won't give the day with pay, 16.7 per cent will allow time off without pay. July 4 is a paid holiday for practically everybody.

Item: Algae, the green substance similar to the slimy green stuff you see on ponds, may provide 30 per cent of the diet for astronauts because it's edible and because it can be used to absorb carbon dioxide—the "used air" people exhale—and to give off fresh oxygen for the spacemen to breathe. One trouble, reports Don Bailer of Aerojet-General Corp.: Too much of it might turn a man a bright yellow. So, if the skipper of the ship radios back to earth that one of his men is turning yellow, that won't mean the astronaut is chickening out. He has been munching too many algaeburgers.

Perspective

Here are three quotations that may put current events into better perspective:

1. We live in an unhappy age. The capitalist is insecure in his possessions. The laborer is discontented with his condition. Professional life abounds in disappointments . . . No century, perhaps, is more characterized by unhappiness than this.

2. It is a gloomy moment in history. Not for many years . . . has there been so much . . . apprehension . . . Never has the future seemed so incalculable . . . In France, the political caldron seethes . . . Russia hangs like a cloud . . . on the horizon . . . All the resources . . . of the British Empire are sorely tried. Of our own troubles in the U. S. no man can see the end.

3. Our earth is degenerate in these latter days. Bribery and corruption are common. Children no longer obey their parents. Every man wants to write a book . . . The end of the world is evidently approaching.

The first quotation appeared in the *New Englander* of January, 1879. The second appeared in *Harper's Weekly*, Oct. 10, 1857. The third was carved on a stone slab in Assyria in 2800 B.C.

Personality

Associate Editor Reed Trask came back from an interview with Maj. Gen. John B. Medaris (photo) impressed with the man who now heads a company, Lionel Corp., which has a split, but successful personality.

Lionel makes model trains and missile components (Page 40). The point of Reed's article is that those diverse products are not as different as they might first seem to be.

The general has a split career, too—from military service to industry. Reed was impressed with him because he has bridged the two so successfully.

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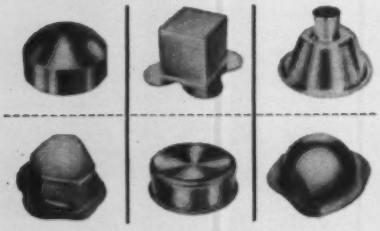

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SINCE 1924

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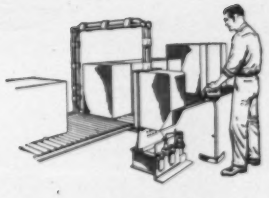

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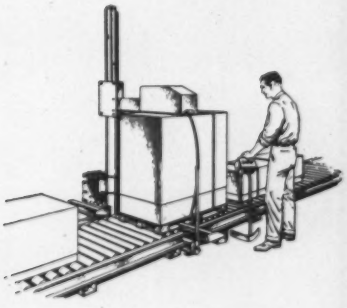

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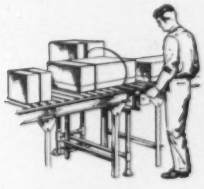

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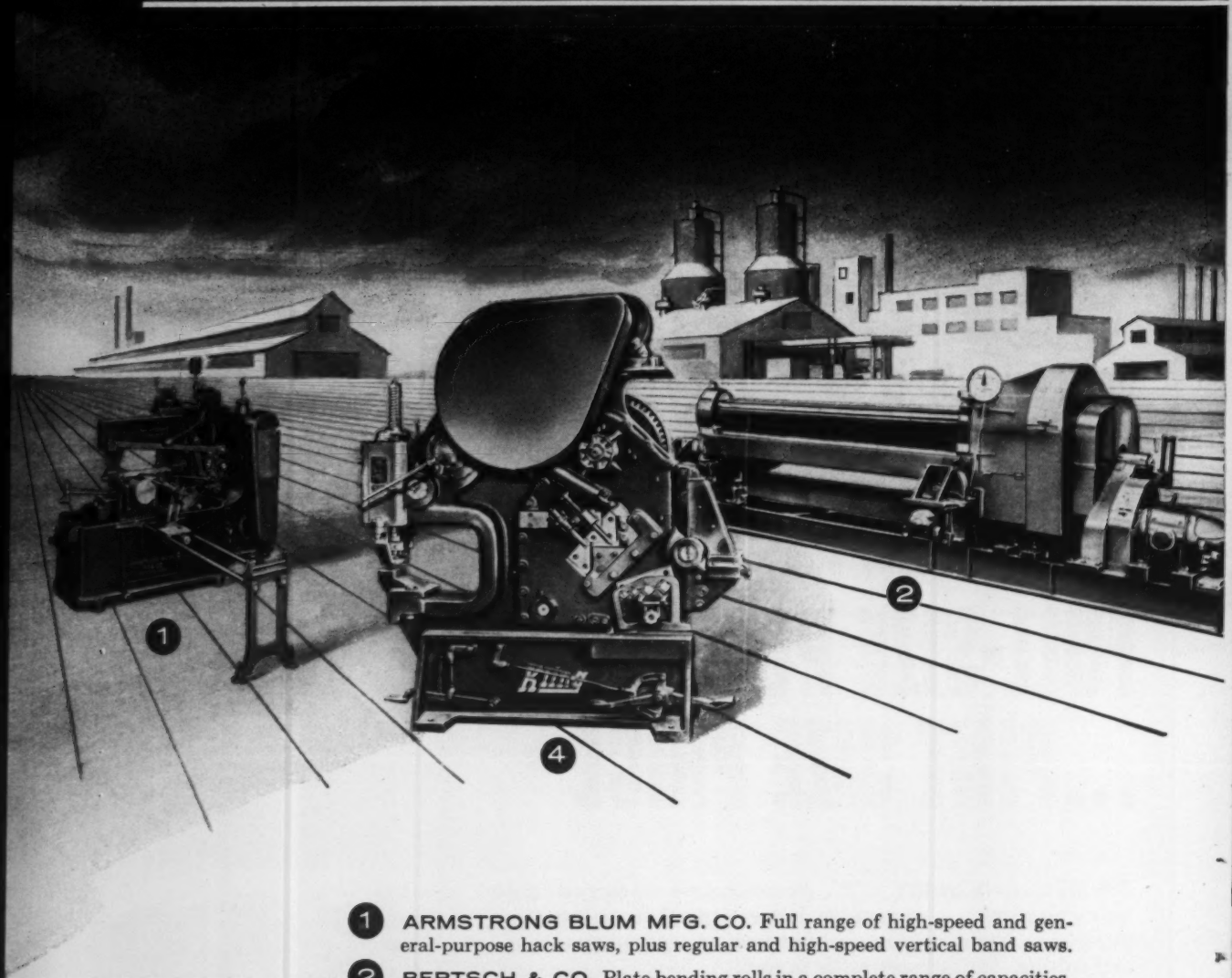

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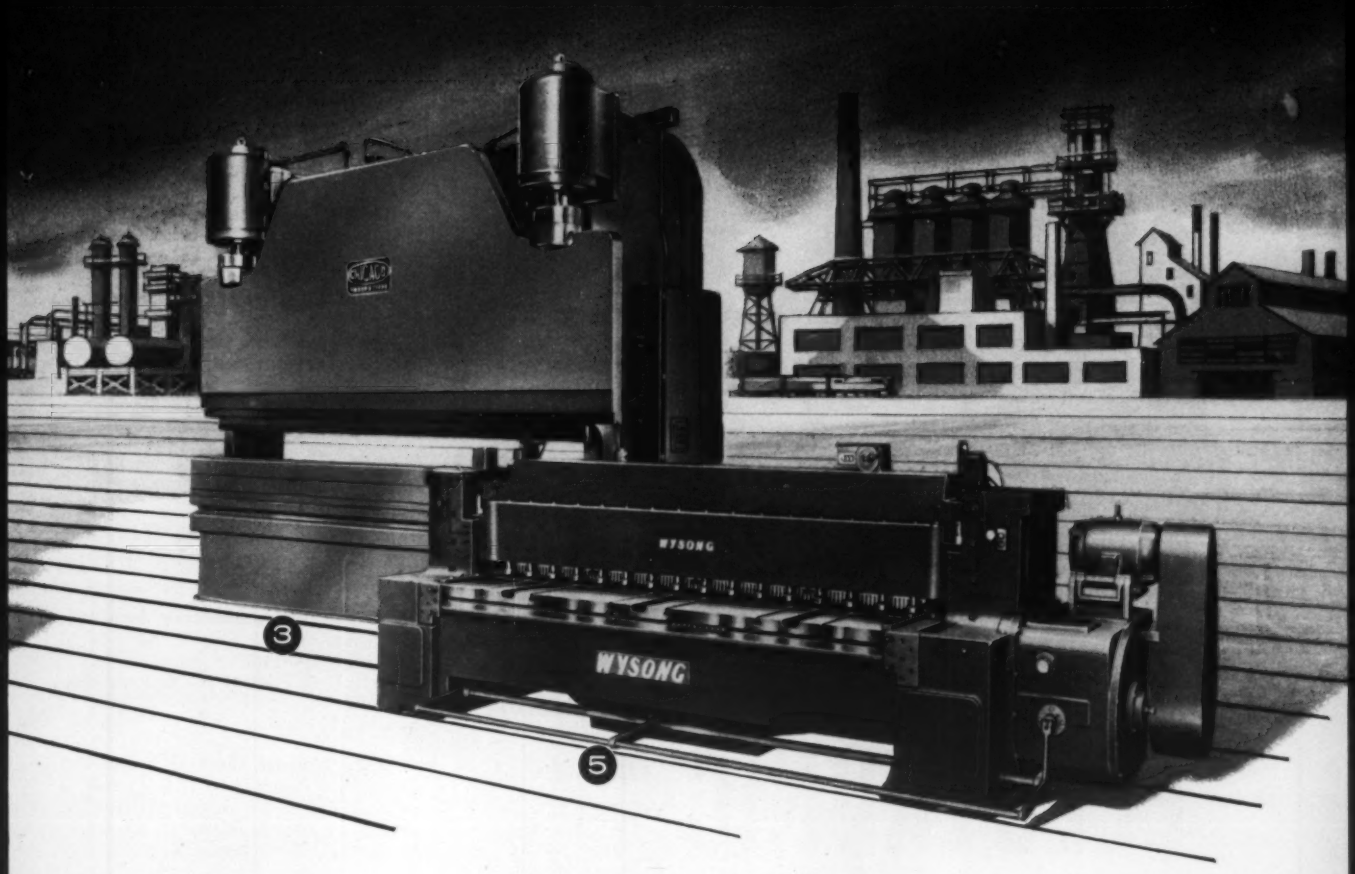

No other single supplier of machinery for metal fabrication can offer you the range of types and models available from Ryerson. So, with no other supplier can you be so sure of getting exactly the right machine to do each fabricating job best at lowest cost.

We represent nearly 100 manufacturers, each a recognized leader in its field. The five featured on these pages represent five good reasons why it will pay you to call in a Ryerson representative when you're considering a machinery purchase. His recommendations are backed by Ryerson experience gained in supplying metal *and* the machinery to fabricate it for over a century.

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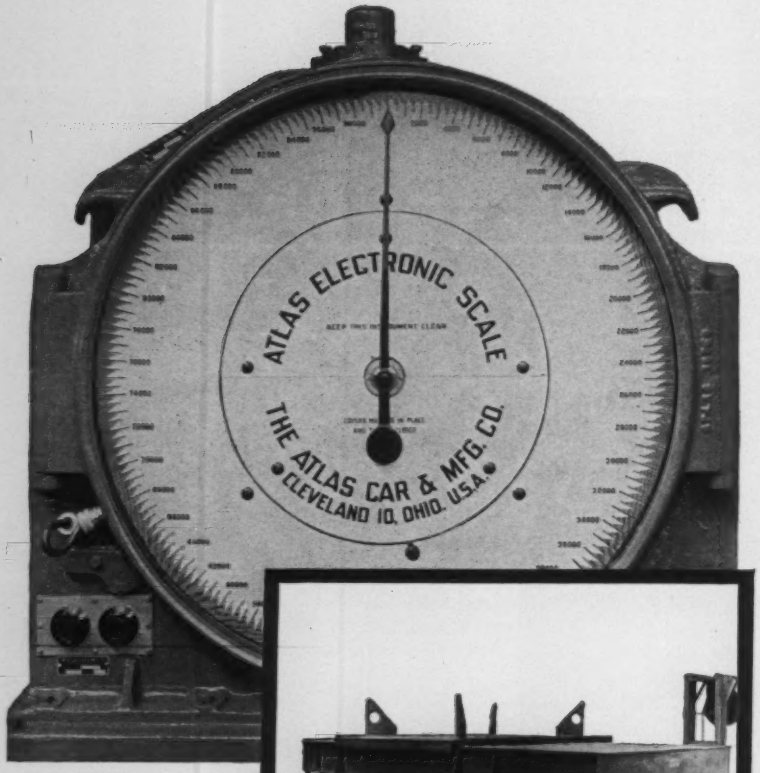

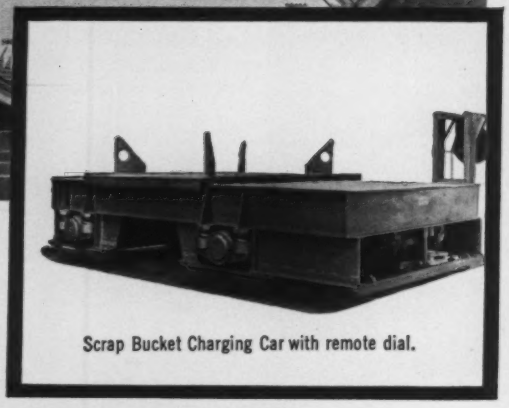

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CALENDAR
OF MEETINGS

June 14-17, Drop Forging Association: Annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Association's address: 55 Public Square, Cleveland 13, Ohio. Executive vice president: Dwight M. Allgood.

June 15, National Association of Secondary Material Industries Inc.: Midwestern meeting, Statler Hilton Hotel, Cleveland. Association's address: 271 Madison Ave., New York 16, N. Y. Administrator: M. J. Mighdoll.

June 18-20, Alloy Casting Institute: Annual meeting, The Homestead, Hot Springs, Va. Institute's address: 1001 Franklin Ave., Garden City, N. Y. Executive vice president: E. A. Schoefer.

June 18-23, American Electroplaters Society: Annual convention, Statler Hilton Hotel, Boston. Society's address: 445 Broad St., Newark 2, N. J. Executive secretary: John P. Nichols.

June 18-23, American Institute of Electrical Engineers: Summer meeting, Cornell University, Ithaca, N. Y. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

June 19-21, American Marketing Association: Meeting and exhibit, Ambassador Hotel, Los Angeles. Association's address: 27 E. Monroe St., Chicago 3, Ill. Executive director: Vance E. Lockhart.

June 19-21, Material Handling Institute: Great Lakes Show, Cobo Hall, Detroit. Information: Shea Expositions Corp., 1 Gateway Center, Pittsburgh 22, Pa. President: L. West Shea.

June 21, Electric Overhead Crane Institute: Meeting, Detroit Athletic Club, Detroit. Institute's address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: J. H. Peritz.

June 22-23, Refractories Institute: Annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Institute's address: 1801 First National Bank Bldg., Pittsburgh 22, Pa. Executive secretary: Avery C. Newton.

June 25-30, American Society for Testing Materials: Annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Thomas A. Marshall Jr.

June 28-30, American Society of Mechanical Engineers: Joint automatic control conference, University of Colorado, Boulder, Colo. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Automatic Race grinder

10″ R Plain grinder

14″ IWR Multiple Wheel grinder

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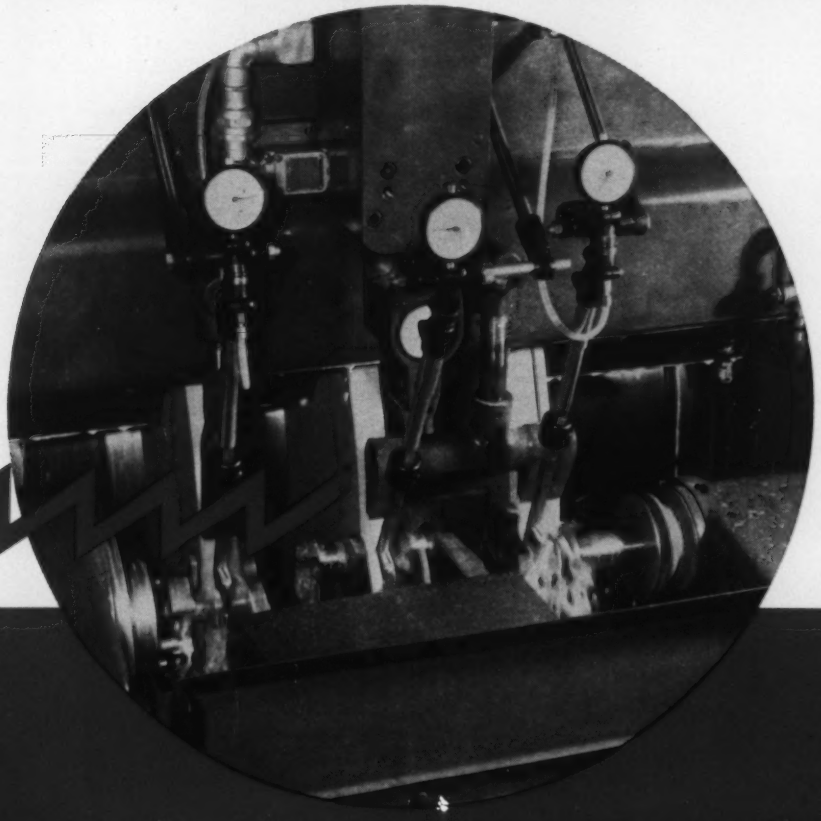

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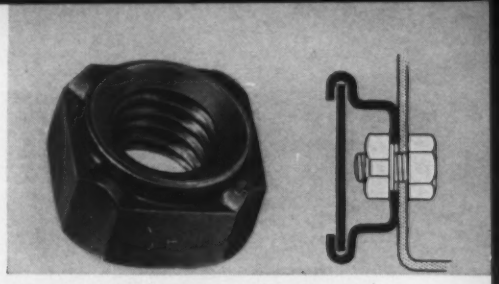
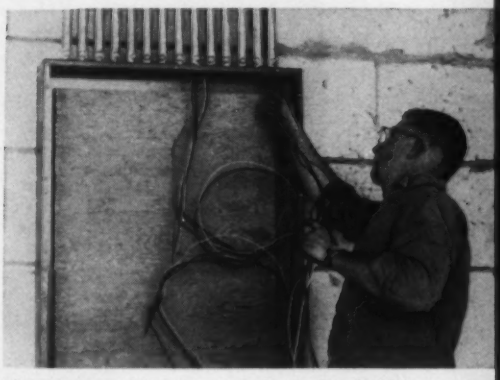


BLIND FASTENING APPLICATIONS are no problem with Republic Midland Weld Nuts—newest addition to the more than 20,000 different types and sizes of Republic Fasteners. They save time, cut costs. Simply premount in places where a wrench can't reach, spot weld in seconds with standard projection welding equipment. Circular pilot guides Republic Midland Weld Nuts into position, protects threads, simplifies automatic feeding. Send for data.



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Name_____ Title_____

Company_____

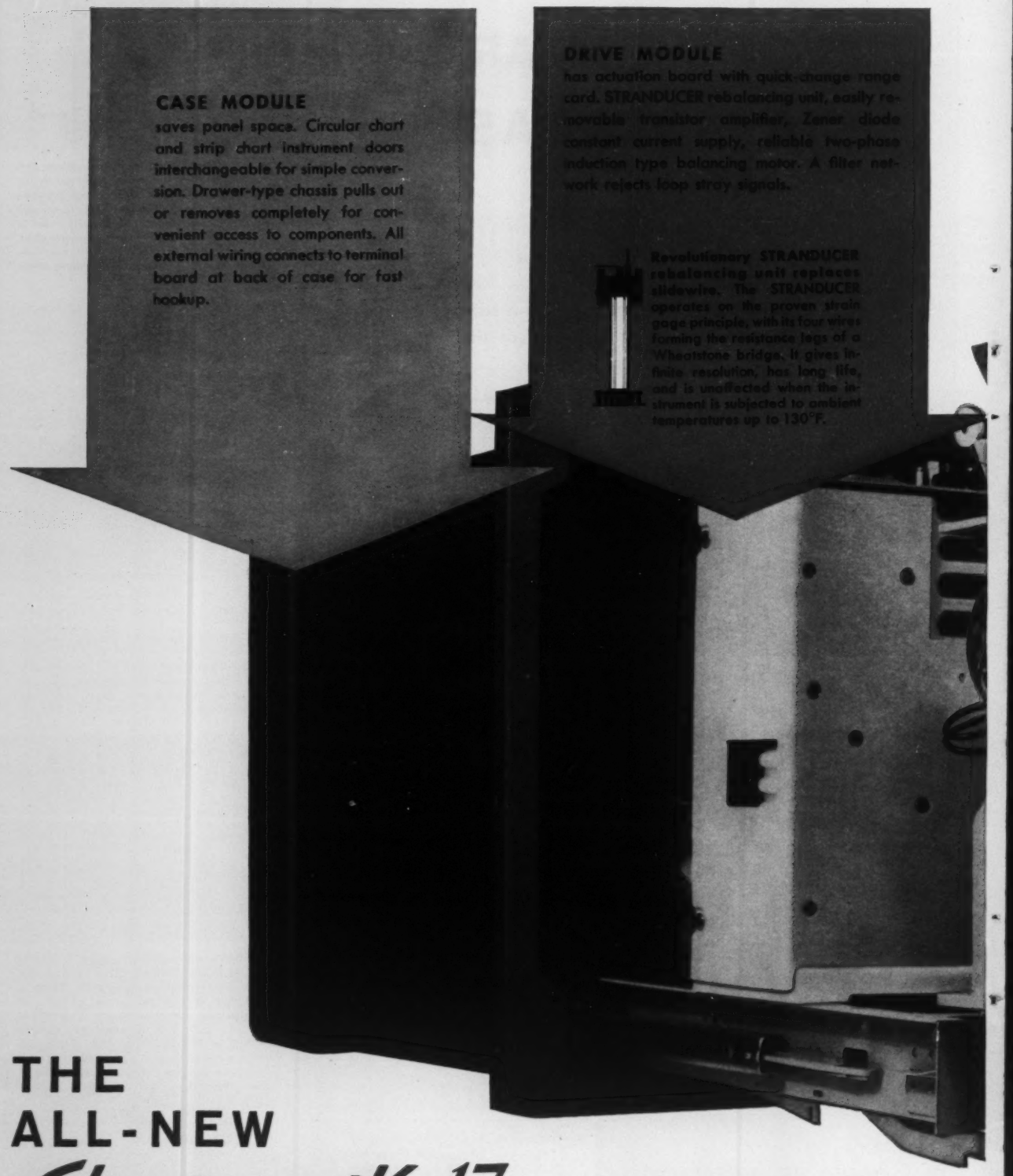
Address_____

City_____ Zone_____ State_____

CASE MODULE
saves panel space. Circular chart and strip chart instrument doors interchangeable for simple conversion. Drawer-type chassis pulls out or removes completely for convenient access to components. All external wiring connects to terminal board at back of case for fast hookup.

DRIVE MODULE
has actuation board with quick-change range card. STRANDUCER rebalancing unit, easily removable transistor amplifier, Zener diode constant current supply, reliable two-phase induction type balancing motor. A filter network rejects loop stray signals.

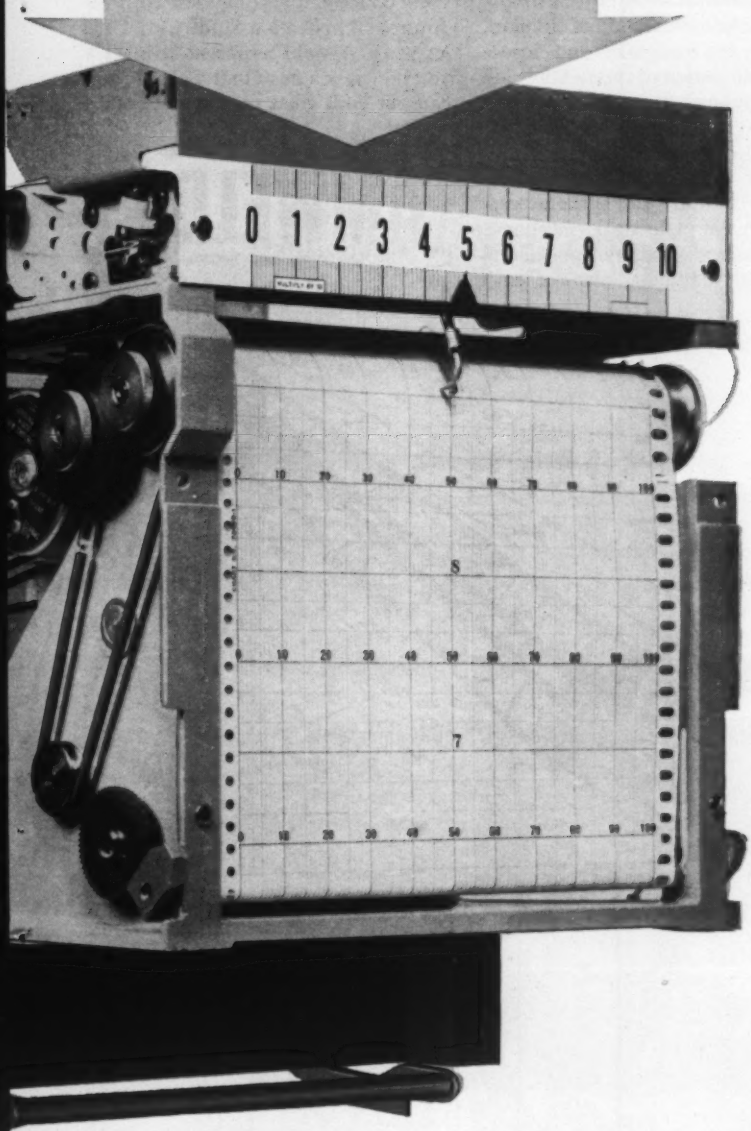
Revolutionary STRANDUCER rebalancing unit replaces slidewire. The STRANDUCER operates on the proven strain gage principle, with its four wires forming the resistance legs of a Wheatstone bridge. It gives infinite resolution, has long life, and is unaffected when the instrument is subjected to ambient temperatures up to 130°F.

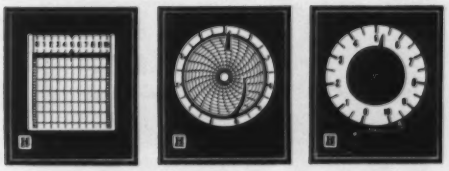


THE ALL-NEW *ElectroniK 17*

...true modular construction makes it the easiest and least expensive of all potentiometers to operate, convert and maintain

DISPLAY MODULE
is directly interchangeable with other *ElectroniK 17* front modules for conversion between strip chart, circular chart, and circular scale operation. Instruments can have up to 4 auxiliary control, and 3 zone control relays, plus the initial set point.





Here, for the first time in a small-case potentiometer, you get all the operating and maintenance advantages of modular design, plus calibrated accuracy within $\pm 0.25\%$, a revolutionary new rebalancing element, the STRANDUCER, that replaces the slide-wire, and many other time-saving, cost-cutting, performance-improving features.

Three basic modules—case, display and drive—make up the *ElectroniK 17*. The case fits standard 19-inch relay racks. Attach a carrying handle, and the instrument is portable. You can easily remove front module for simple conversion from strip chart to circular chart operation. Pull the chassis out to the service position or remove it completely without tools. Vary chart speeds ½ or 2 times basic speed (1, 2, 6, 10, or 60 inches per hour) by replacing quick-change drive gears. Change range simply by changing range cards. A Zener diode constant current supply eliminates battery problems. Plug into the instrument up to 8 contact control units for widely varied control possibilities.

ElectroniK 17 instruments are available as strip or circular chart recorders, or circular scale indicators. They can have electric contact control, with all control units of convenient plug-in design.

For the eye-opening details on great new *ElectroniK 17* instruments, call your nearby Honeywell field engineer today, or write to MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa. — In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell

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HONEYWELL INTERNATIONAL Sales and Service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan

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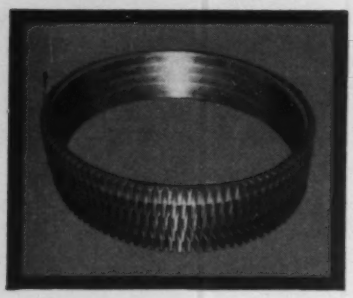


Let Amweld show you how much flash butt-welded rings can cut your costs!

Amweld flash butt-welded rings will curb your ring costs two ways. One, you'll save on metal, because Amweld can form your ring from stock produced to or near finished dimensions. Two, you'll save on machining, because unnecessary metal is left at the mill—not machined away in your shop.

Through close evaluation of circular components and assemblies and close-tolerance fabrication of rings, Amweld saved its customers more than one million dollars last year alone. Savings were recorded by manufacturers in almost every industry—construction equipment, motors and generators, fabricated metal plate work, mechanical power transmission, transportation and materials handling, also jet engines and missiles where Amweld's ability to flash weld exotic materials to exacting specifications offers proof of Amweld quality.

Investigate now! To see how Amweld saved Gar Wood 19% and 26% on rings for truck-mounted cranes, send coupon for your free copy of Amweld Application Study C-1. Then let your Amweld representative show you how much flash butt-welded rings can cut your costs on any part that's round!

AMWELD®
INDUSTRIAL PRODUCTS

The American Welding & Manufacturing Co.
804 Dietz Road, Warren, Ohio

Yes, send Gar Wood Application Study along with full details on Amweld flash butt-welded rings as a cost reduction opportunity.

Name & Title_____

Company_____

Address_____

City_____

State_____

Amweld sliced 19% off the rough ring cost of the 50"-diameter, 1020 carbon-steel gear used in the Gar Wood crane's rotating table. Savings on rings of 23" and 28" in diameter totaled 26%. Mail coupon today for the complete Amweld savings story.

Kennedy Seeks Worker Retraining Setup

President Kennedy has sent to Congress a recommendation to set up a "manpower development and training program" to meet the needs of workers unemployable because their skills are obsolete. Several hundred thousand men would be retrained in the next four years, with the first year's (beginning July 1) cost estimated by the Budget Bureau at $60 million. Allowances for retraining would not be permitted to exceed the state's weekly unemployment compensation check.

Presidential Board to Settle Missile Labor Problems

President Kennedy has created a special mediation board to settle jurisdictional union disputes and prevent work stoppages in the missile program. The board will have three union members, three industry members, and three public representatives. The board will hear disputes and recommend settlement terms. It will have no legal sanctions to enforce its recommendations.

Consultant Says Tunisia is Worthy of Investment

"Investors may consider looking into Tunisia—an ably governed, relatively stable, unaligned but pro-Western country," says S. J. Rundt, New York consultant on international business. Last year, Tunisia obtained about $20 million in U. S. help. A ten year, $800 million, development plan has been drafted. Substantial U. S. assistance is assured. Foreign capital is welcome and protected. "President Bourguiba is doubtlessly the most enlightened and capable of all Arab leaders," says Mr. Rundt.

Service Centers Aim at Better Cost Data

Plagued by low profits (1.6 per cent of sales last year), service centers are looking at the costs of services they provide—such as slitting, shearing, flame cutting, and grinding. "Some of these services need price boosts," said Robert J. Heggie, president, A. M. Castle & Co., at the opening of his firm's new Cleveland steel and aluminum service center. The firm has ordered a computer and hopes to cut operating inventories 20 to 40 per cent.

NLRB Reorganization Plan Submitted

The National Labor Relations Board will be modernized along the lines the President has proposed for other regulatory agencies (STEEL, May 22, p. 83), if Congress approves. The board would be given the right to delegate "any of its functions" to one of its own divisions, an individual board member, a hearing examiner, or an employee. The functions include hearing a case,

making a determination, issuing an order, certifying, or reporting of any matter before the NLRB. It means only cases of major significance would have to go to the board.

Campaign for Profit Growth

Your plant can be a marvel of efficiency and your product popular with the customer, but you may still make no money because of a bad government climate. In the 86th Congress, 57 senators and 218 representatives consistently voted in opposition to business. More and more managers recognize the need to win better conditions at local, state, and national levels. For tips on how to campaign for profit growth, see Page 47.

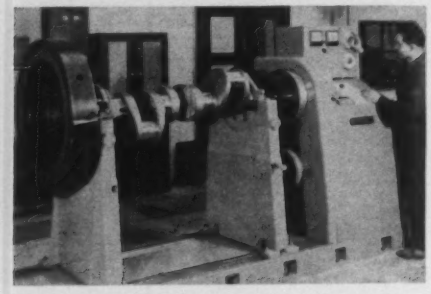
You'll Take a Computer Along on 1970 Vacation

The vacationing businessman of the 1970s will take off with his golf clubs, fishing tackle, and computer console about the size of a portable radio, predicts John L. Burns, president, Radio Corp. of America. By plugging the computer into a standard telephone outlet and dialing a code number, the executive will be put in instant contact with his company's master data processing system. He'll be able to handle his work routine as if he were in the office.

Reactor Fuel Price May Be Cut

The Atomic Energy Commission is considering cutting the price it charges for atomic reactor fuel. That would lower the cost of producing electric power in atomic plants and could speed the day when such plants become more competitive economically with conventional powerplants.

Balancing Equipment Finds More Jobs



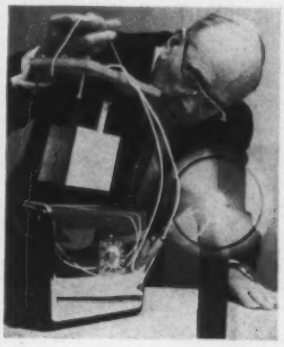
Look for greater use of precision balancing equipment in manufacturing and maintenance over the next few years. Reasons: The need for faster machine speeds, the desire for still smoother machine operation, and the promise of longer life for vital components. See Page 82.

'Measurement Gap' Plagues U. S.

Rep. Overton Brooks (D., La.), chairman of the House Committee on Science & Astronautics, says the U. S. faces a serious "measurement gap." He says our missile program is being hampered by our inability to make accurate measurements. Testifying before the committee, Dr. C. M. Herzfeld, acting

associate director, National Bureau of Standards, said: "National needs for measurement capability vastly exceed our present ability to meet those needs." He cited unmet requirements in radio, forces, and temperature fields. One example of the gap: A new photoelectric pyrometer went into operation in the U. S. last month, but the Russians have been using a similar device since 1958 and are working on a better one.

Toaster Principle Used to Generate Electricity

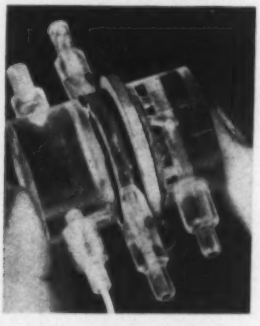


Power enough to drive a small electric motor and its propeller is produced when these two thin plates are heated like pieces of bread in a toaster. Even when removed from the heat source, the plates continue to produce electricity as long as the stored heat remains. Called the "Austin effect," after its discoverer, Westinghouse engineer B. O. Austin, the power source is rechargeable in the same way as a battery in a car. The plates are constructed with a coating of enamel combined with iron and silver.

The Good Life in the Year 2000

An average life span of 100 to 120 years, some solution to food and population problems, wide utilization of new forms of energy, over half the educative process conducted by teaching machines, and creative ability at the age of 100. Those predictions were made by Forrest H. Kirkpatrick of Wheeling Steel Corp. before the American Society of Training Directors. He said: "Management development programs must include more basic information about research in human nature and in all the social and natural sciences."

Tiny Fuel Cell Hints of Things to Come



This experimental fuel cell, no bigger than a wrist watch, may be the ancestor of power units of the future that will propel submarines in silence and feed emergency power to missile bases. This cell, developed by Dr. J. S. Smatko, senior scientist at Hoffman Electronics Corp., produces 1 watt of power (vs. 2/3 watt from a common flashlight cell). Its estimated life is in excess of 10,000 charge-discharge cycles. Dr. Smatko says cells of this type could be made as small as an aspirin tablet.

Garnishment—Growing Management Problem

Managers fear four times as many garnishments in 1961 as there were four years ago, says the Associated Industries of Cleveland. The cost burden is big. For example: A Long Island Railroad survey indicates that management's collection cost averages about $20 per $100 of employee indebtedness. AIC suggests that management use its employee communication vehicles to create employee awareness of the problem and wariness of unethical sales

STEEL
The Metalworking Weekly

June 5, 1961 Vol. 148 No. 23

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tactics, such as add-ons, balloon notes, and deficiency judgments. AIC also suggests the use of in-plant banking plans that encourage employee thrift and financial responsibility.

Justice Will Seek Jail for Antitrust Violators

High Justice Department officials firmly believe that jail sentences must be used against violators of the antitrust laws on the grounds that high corporate officials are "personally responsible" for what their corporations do. The same officials told STEEL they believe that the jail terms in the electrical industry cases have already had "a good effect" on industry.

Coke Oven Producers Told to Step Up Quality

Petroleum companies and chemical manufacturers are threatening to take the aromatic chemicals market away from the coke oven producers that have traditionally dominated the market. The only chance for survival is to market material of comparable quality to petroleum-derived BTX and naphthalene, Martin Faye of U. S. Industrial Chemicals Co. told the American Coke & Chemicals Institute.

Straws in the Wind

Makers of gas water heaters shipped 268,300 units in April—a record for the month—reports Gas Appliance Manufacturers Association . . . The consumer price index remained unchanged in April for the second consecutive month . . . April building permits rose to the highest level in ten months, reports Dun & Bradstreet Inc. . . . Auto industry labor and management were warned by Labor Secretary Goldberg that a strike this summer would be "intolerable" . . . The Labor Department says a gradual employment pickup began in March and will continue at least through mid-July . . . Net new orders for industrial heating equipment in April totaled $4.2 million, down 24 per cent from the March volume, says the Industrial Heating Equipment Association . . . The American Management Association has established an affiliate, the Presidents' Professional Association, dedicated to research and educational activities for chief executives . . . General Dynamics Corp. and Lockheed Aircraft Corp. will study, for the National Aeronautics & Space Administration, the potential performance of a Saturn booster with nuclear powered upper stages for space travel.

Metalworking Pulse

The Business Trend: For the first time since mid-November, 1960, STEEL's industrial production index is above the year-ago level. **Autos:** Output of passenger cars was expected to dip below 100,000 in the week ended June 3 as the industry observed Memorial Day. Look for renewed activity at the May level during most of this month. **Steel:** When figures for the week ended June 3 are in, it's expected they'll show ingot production leveled off over the holiday.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49=100)
  Week ended May 27 . . . 164†
  Year ago 159
  Details on Page 57

- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended June 3 . . 90,000*
  Year ago 115,068
  Details on Page 54

- **STEEL INGOT OUTPUT (TONS)**
  Week ended June 3 2,080,000*
  Week ago 2,077,000
  Details on Page 118

†Preliminary. *Estimated.

NEUTRAL... BUT NOT TO GREASE!

NEU-TRI® solvent, Dow's super-stable *neutral* trichloroethylene for vapor degreasing, maintains its safety and effectiveness over long periods. Under heavy work loads or adverse operating conditions, a built-in, neutral-stabilizing system keeps NEU-TRI free of acids and other corrosive chemicals for an extended time.

Add the other advantages . . . *no* flash point, low degreaser operating costs because of low boiling point, and high solvent power on oil, grease, and tars . . . and you will see why NEU-TRI solvent is best for efficient, low-cost degreasing.

Ask your distributor of Dow solvents. He has complete information about NEU-TRI and other Dow solvents for every application: Chlorothene®NU, trichloroethylene, perchloroethylene, and methylene chloride. He will be happy to explain uses, recovery, and costs. Or call your nearest Dow sales office.

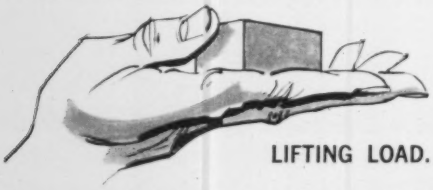
SEE YOUR DISTRIBUTOR OF DOW SOLVENTS FIRST!

THE DOW CHEMICAL COMPANY DOW Midland, Michigan

Cleveland Tramrail Stackers Serve You Like a GIANT HAND

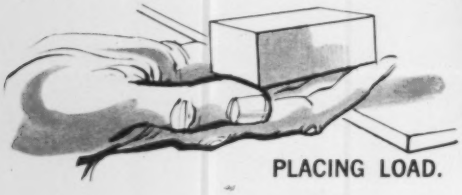
This particular stacker is rated 3 tons and lifts loads from the floor to a maximum height of 15′-6″. (Others may go higher and have greater capacity.) It may be traveled to any part of the room covered by the crane and rotated 360° either way. With load-lifting fork in high position, the clearance below stacker to floor is 8′-0″.

ENGAGING LOAD.

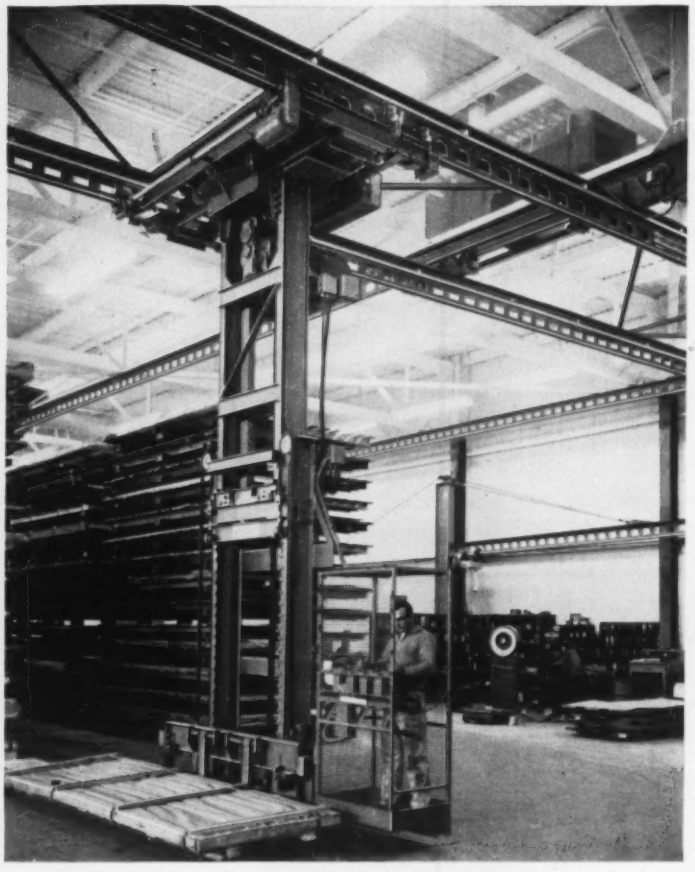


LIFTING LOAD.

TURNING LOAD.



PLACING LOAD.



Flick a controller and a Cleveland Tramrail Stacker Crane goes to work. Like a giant hand it quickly slides under a heavy load, lifts it gently and moves it wherever directed within the area covered by the supporting crane.

It is extremely flexible in action and works in close quarters to great heights. It can be rotated in either direction through 360° and more.

All motions of stacker and crane are controlled in the crane cab and can be inched for accurate positioning of the lifting fork. Loads can be spotted easily because they do not swing.

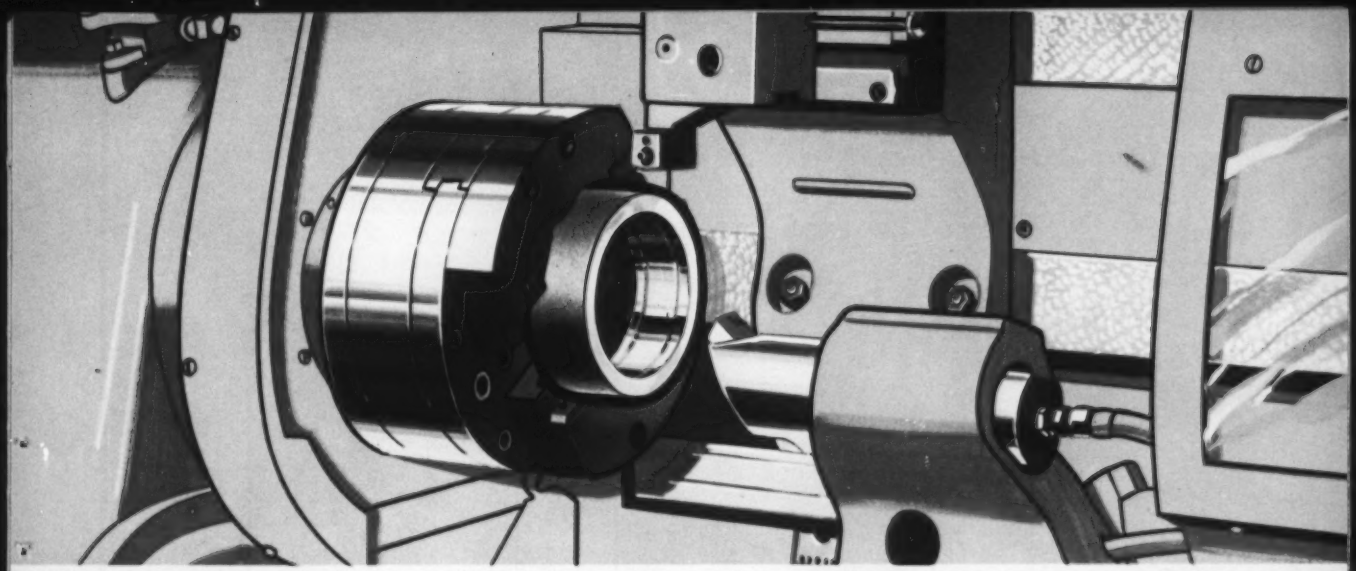
One man can handle great amounts of materials in a day without floor assistants. Some Cleveland Tramrail stackers will take materials directly from incoming trucks or railroad gondola cars directly to storage racks in one quick move. Stackers pay for themselves through time they save.

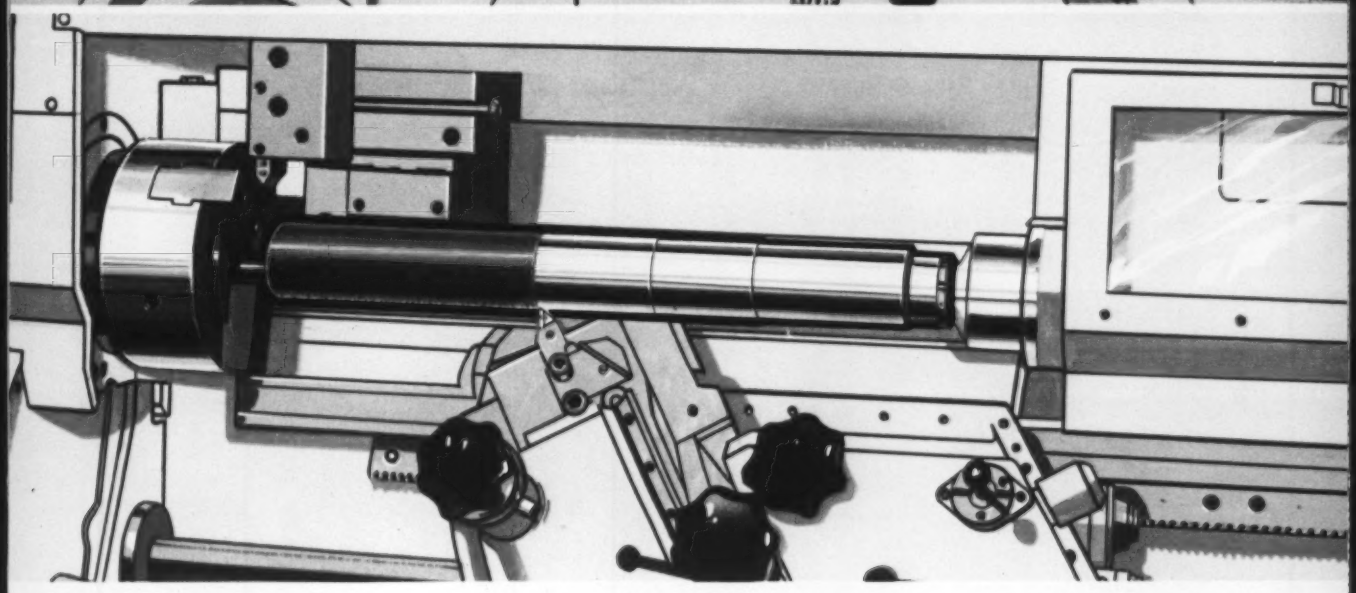
There are various types of Cleveland Tramrail stackers. They can be tailored to exactly suit your building and handling requirements. A Cleveland Tramrail sales engineer will be glad to give you the details.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7857 E. 290 ST. • WICKLIFFE, OHIO





Years-ahead flexibility
in New Britain's +GF+ *Copying Lathes*

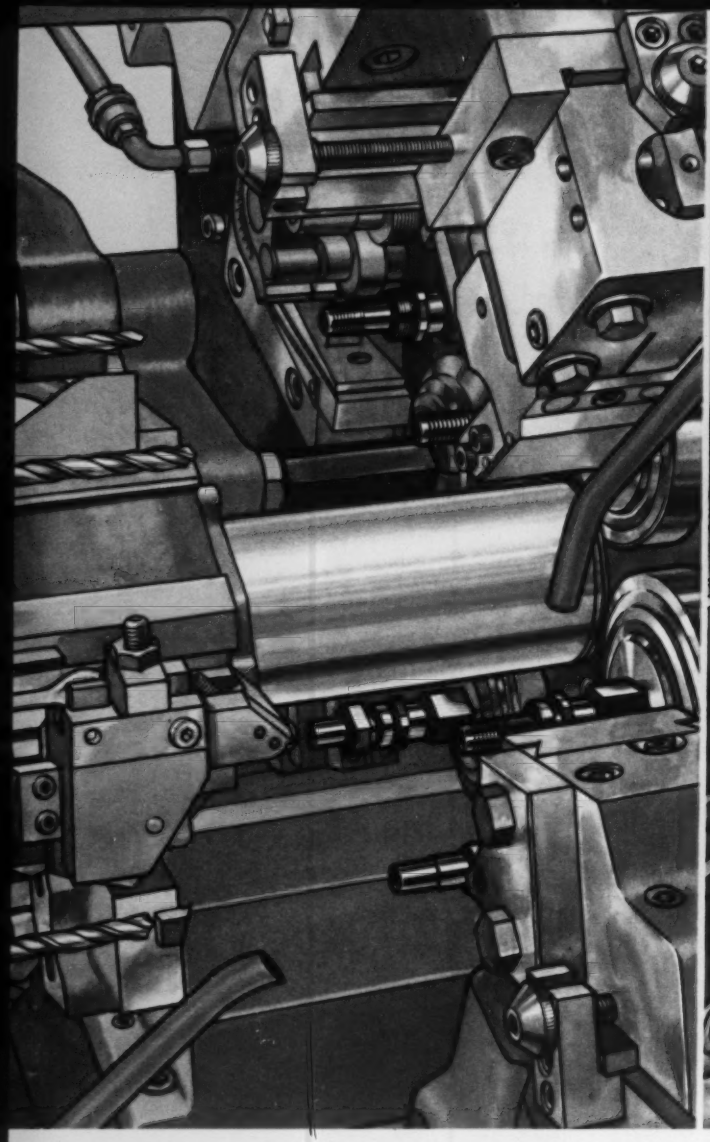
One of the best ways of making sure you're on the right track when you buy a new machine is knowing what you want the equipment to do and then being sure the equipment you buy can do it. This sounds pretty basic, but it's difficult to forecast just what you are going to require of a machine through all the years you will use it. In this department, the New Britain +GF+ Copying Lathe has a lot of peace-of-mind insurance built right into it. For instance, the basic design of the machine suits it for a wide variety of work. The single-tool copy-turning principle is equally well suited for both chucked *and* between-centers work on internal and external surfaces.

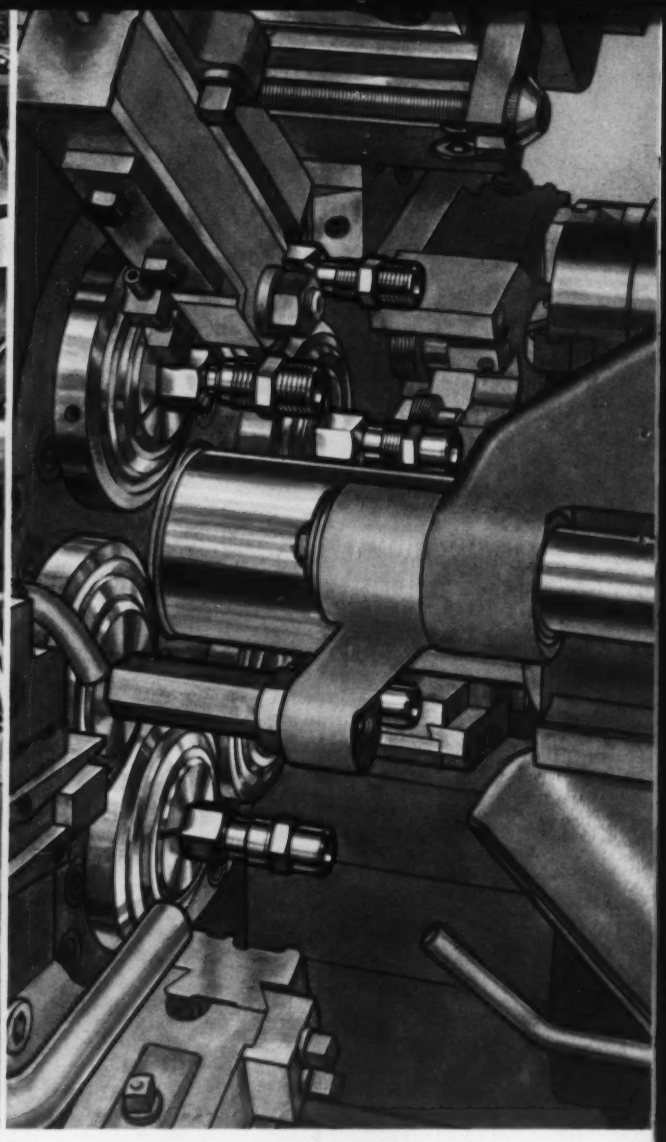
Because the tool path is controlled by an easy-to-install template (or a prototype) set-up and change-over are accomplished in a few minutes. The cutting tool can be replaced in a matter of seconds. Back facing is accomplished as part of the machining cycle by means of a top-mounted attachment.

The New Britain +GF+ is truly a machine that can pull more than its own weight in any metal-working shop. On top of that, it can adapt quickly and easily to the widest possible number of new requirements that may be placed on it in the years to come. A new catalog describes the complete line in detail.

THE NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division • New Britain, Connecticut





Stainless, 225 per hour— brass, 1500 per hour

Speed is only part of the story on New Britain's completely new line of four-, six-, and eight-spindle bar machines. Guaranteed accuracy, production run after production run, year in, year out, helps round out the story. If you haven't seen any of the new series in action—six models in all—you owe it to yourself and the profitable productivity of your plant to arrange for a demonstration. All of the exclusive New Britain features you are probably familiar with have been retained and improved. New features unavailable on any other machines have been added. The result—the finest high speed bar turning units on the market. Your New Britain representative is the man to see. He can show you applications, parts production case histories, show you to fractions of seconds and pennies why new New Britain bar machines are an investment in greater profits with every piece they produce.

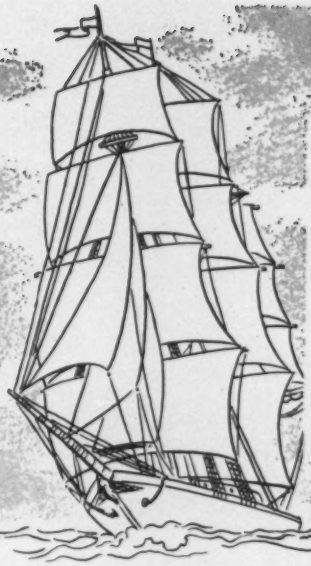
Model	Spindles	Cross Slides	Spindle Speeds	Spindle Capacity	H.P.
450	4	4	41-621	5⅛"	30-50
52	6	6	271-4250	1¼"	15-25
62	6	6	177-2519	1⅝"	15-30
62	6	6	177-2519	2¼"	20-30
635	6	6	63-630	3½"	30-50
826	8	6	98-1481	2⅝"	30-50

THE NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division ◆ New Britain, Connecticut

Why Rust-Oleum is different—

and what this difference, backed by 35 years of industry proof, means to you!



A Sea Captain developed it . . . Industry proved it!

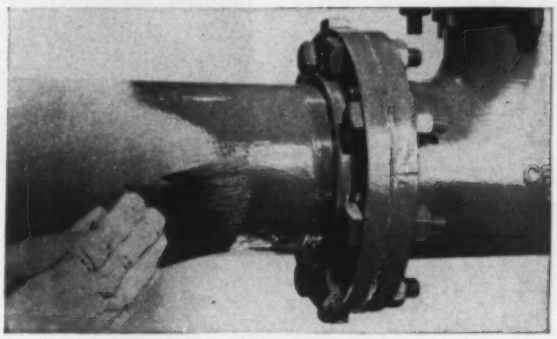
The original Rust-Oleum formula was developed nearly fifty years ago by Sea Captain Robert Fergusson, who became intrigued with the rust-stopping qualities of fish oil early in his career. Creating a *special treatment* for the fish oil, he used the *specially-processed fish oil* as the vehicle in combination with fine rust-inhibiting pigments. The result? A coating that actually *stopped rust* when applied directly over sound rusted surfaces, after scraping and wirebrushing to remove rust scale and loose rust. Possible, because the *specially-processed* fish oil penetrated the rust to bare metal. This was the birth of Rust-Oleum's *exclusive* 769 Damp-Proof Red Primer.

PROVED THROUGHOUT INDUSTRY FOR OVER 35 YEARS

Today, Rust-Oleum in its many systems and colors, has been proved throughout industry for over thirty-five years. This proof by leading industrial users is your assurance of savings in time, money, and metal. Economies made possible by the fact that Rust-Oleum 769 Damp-Proof Red Primer goes right over the sound rusted metal—usually eliminating costly surface preparations. And Rust-Oleum, in its various systems, resists rain, sun, fumes, heat, weathering, chemicals, etc., for lasting beauty over the years.

RUST-OLEUM NEW COLOR HORIZONS SYSTEM

The Rust-Oleum New Color Horizons System introduces a new coating concept to industry. It combines four important factors: (1) the ability to stop rust, (2) smart, modern color harmony, (3) the durability to last and last, (4) ease of application that saves time, money, and metal. See how this system can bring lasting beauty to your plant, machinery, equipment, pipes, tanks, structural steel, fences, etc. Write for complete information or contact your nearby Rust-Oleum Industrial Distributor. He maintains complete stocks for prompt service.



RUST-OLEUM®

There are imitations, but only *one* Rust-Oleum. It is distinctive as your own fingerprint.

STOPS RUST!®

ATTACH TO YOUR LETTERHEAD

Rust-Oleum Corporation
2598 Oakton St., Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ New Color Horizons Systems Catalog featuring 110 actual color standards and 69 photo applications.
- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer to be applied over sound rusted surface.
- ☐ Results of radioactive tracing study on Rust-Oleum fish oil penetration.

Automatic

Briel Industries, manufacturer of aluminum extrusion billets and ingots for die castings, uses a Barber-Colman automatic control system. A centralized instrument panel controls temperatures in the Briel melting, holding, and homogenizing furnaces. Flame-otrol Combustion Safeguards are also interlocked with process controls in the panel.

Industrial Instruments • Automatic Controls • Air Distribution Products • Aircraft Controls • Electrical Components

Chain lightning has been chained by man's inquiring mind. The step from rampant force to docile obedience was . . . . .
A MATTER OF CONTROL

Process Control Systems...

With a few millivolts, fine instruments, and twenty-five year's experience, Barber-Colman builds a better process control SYSTEM. From the hundreds of instruments available they will specify and coordinate each component to provide you sound, profitable, process control. A Barber-Colman Sales and Service Engineer will help you plan, select, install and maintain your process — systematically. Call him through the Yellow Pages.

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Wheelco Industrial Instruments Division

Small Motors • OVERdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

NEW

CAGEROL®

CAGE TYPE
HEAVY DUTY
NEEDLE ROLLER
BEARING

BY McGILL®

INCREASE EXPECTED LIFE UP TO 10 TIMES!

You need CAGEROL bearing performance if higher speeds and increased misalignment have prevented the utilization of needle bearing load capacity in your applications. Most important, CAGEROL bearings can deliver up to 10 times more expected life where misalignment and increased speeds exceed the capabilities of ordinary and guided needle bearings. The difference is in the exclusive McGill construction that features tapered retainer pockets for balanced roller guidance, crowned rollers, and black oxide retainer finish. CAGEROL bearings are interchangeable with all heavy duty needle roller bearings — with or without inners in two bore sizes.

McGILL MANUFACTURING CO., INC., Bearing Division
301 N. Lafayette Street, Valparaiso, Indiana

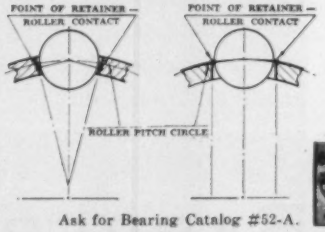
1 Exclusive crowned roller construction, electronically gauged to insure precision contour and size uniformity. Relieved ends assure even load distribution.

2 Flat ends fully engage integral race shoulders. provide maximum support.

3 Proper guidance assured by tapered retainer pockets. The design insures *balanced* roller support and eliminates corner wear from edge loading of straight pockets where retainer OD and pitch circle are coincident.

4 Simultaneously punched pockets assure accuracy of race and roller alignment. The black ferrous oxide retainer finish absorbs and retains lubrication, reducing the friction coefficient.

5 SAE 52100 steel outer race has optimum hardness and surface finish.



Ask for Bearing Catalog #52-A.

engineered electrical products

McGILL®

precision needle roller bearings

Stop looking for spring wire in large coils...it's here (*courtesy of Roebling*)

This is really an enormous availability — 3000 pounds of high carbon spring wire in a single, nonstop coil. You know what this means. Uninterrupted productivity. You make more of your products faster and, as with *any* length of Roebling spring wire, you make them better.

This, of course, is in addition to the already wide selection of Roebling wire in all kinds of sizes and gauges. Whatever you specify in spring wire — for quality — the word that comes first is Roebling.

For information on *any* size coil, ask Roebling's Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

ROEBLING

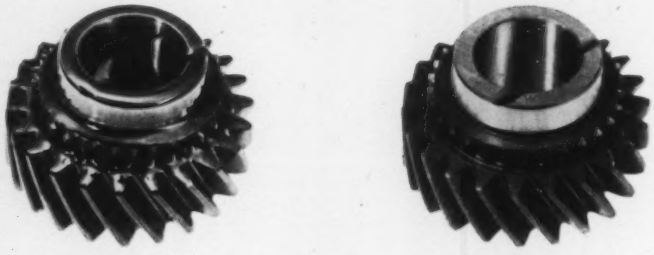
Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

Water-soluble cleaners make safe, efficient replacements for solvents

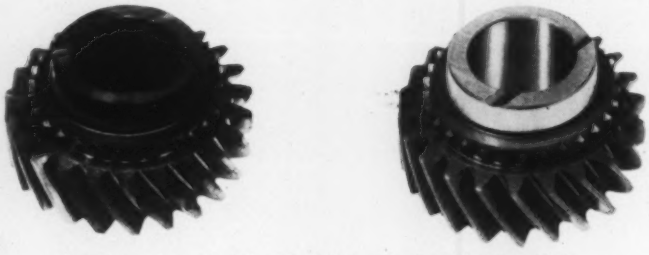
Many of the metal cleaning jobs which have been done with petroleum solvents can now be done as efficiently—if not more so—with the new high detergent cleaners now available. Though solvents are highly effective in the removal of mineral or vegetable oil deposits, they are ineffective on inorganic residues. They are also highly flammable and extreme precautions must be taken to prevent the fluids or fumes from ignition.

Another of the precautions necessary with many solvent type cleaners is protecting workers from the toxic vapors. Open tank equipment must be kept covered when not in use.

Immediately after parts are cleaned with these solvents, a rust preventive must be applied since they provide no protection and corrosion will occur in a few hours even in a moderately dry atmosphere.



Finish machined gear before and after immersion in Cerfa-Kleen CST.



Heat treated gear before and after cleaning in Cerfa-Kleen HPW.

Detergent cleaners for machining

It has been common practice for machine tool operators to have a pan of cleaner handy to permit cleaning of parts for checking purposes. This function can be performed by a water-soluble, highly detergent cleaner such as Houghton's Cerfa-Kleen CST. To provide efficient dip cleaning, only 6 to 12 ozs. per gallon of water are required. Toxicity and fire hazard are eliminated and both organic and inorganic soil are efficiently removed.

For power washer cleaning of machined parts, a cleaner such as Cerfa-Kleen HPW is remarkably effective. This mildly alkaline compound works best at temperatures between 150°F. and 185°F. and at concentrations of only ½ oz. to 2 ozs. per gallon of water. Fire danger and toxicity are overcome and a built-in rust preventive provides adequate protection between operations.

Cleaning after heat treating

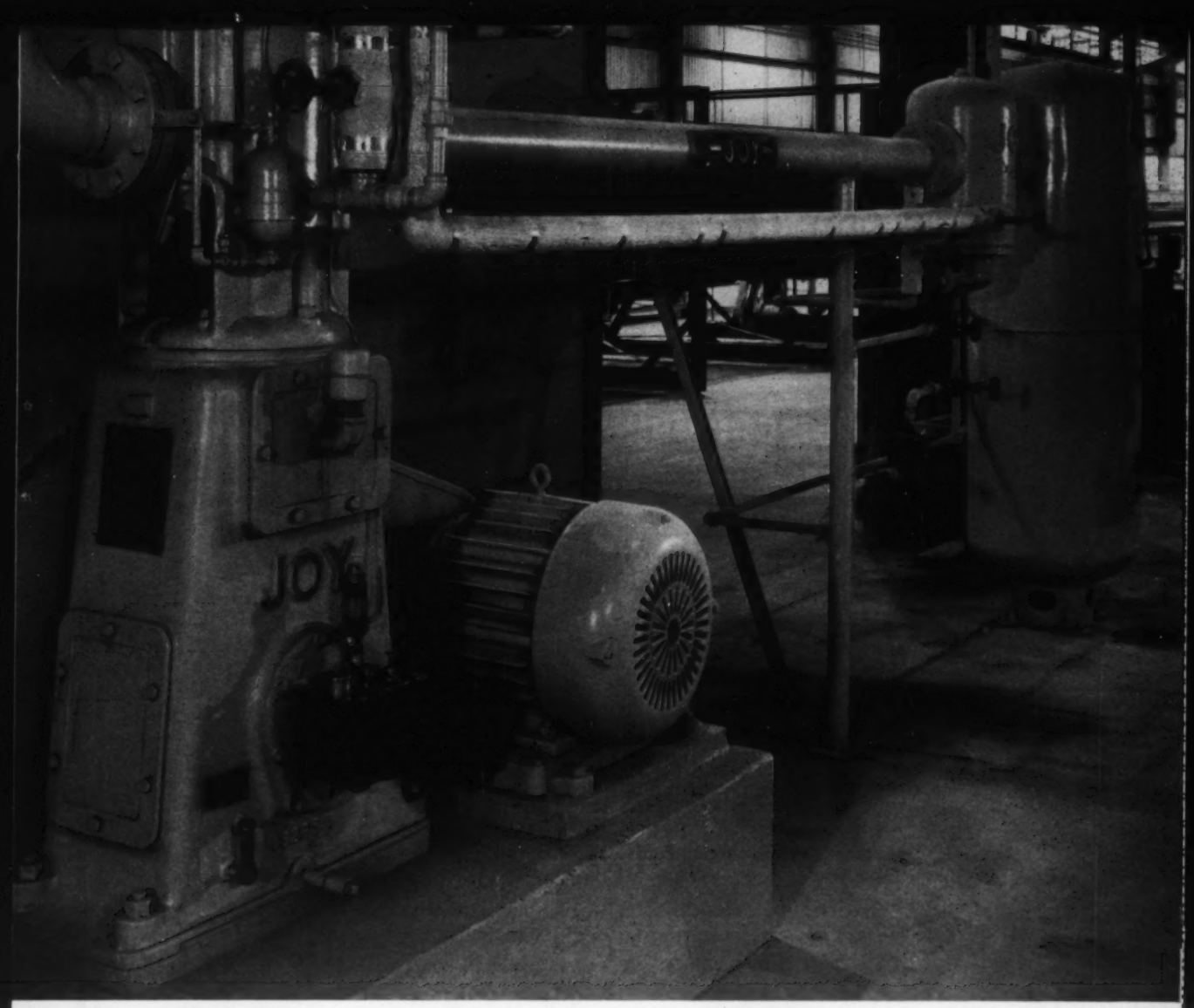
Because of the efficiency of the new high detergent-alkaline cleaners, the inorganic soil deposited on parts in the heat treating process can be easily removed and rust protection provided in one operation. Here again, a product such as Cerfa-Kleen HPW will do an outstanding job. Through a powerful bi-phase detergent action and mild alkaline action, this product provides the ultimate in cleaning efficiency.

Years of experience by Houghton in the cleaning problems of the metalworking industry has led to the development of the four new Cerfa-Kleens. These four fill the needs of the great majority of plant operations. For detailed information, call your nearby Houghton Man or write E. F. Houghton & Co., 303 W. Lehigh Avenue, Phila. 33, Pa.

Houghton

INDUSTRY'S PARTNER IN PRODUCTION

Philadelphia • Chicago • Carrollton • Detroit • South San Francisco • Toronto



Century motor powers air compressor around the clock . . . .

This 25-horsepower Century motor helps furnish compressed air vital to the manufacture of gypsum-derivative products. With the plant operating three shifts daily, a constant supply of compressed air is needed to sustain the manufacturing process.

Century motors are especially suited for compressor applications because of their capacity to take frequent on-off cycling. Their high starting torque activates the tightly enclosed compressor pistons almost instantaneously. The Century totally-enclosed-fan-cooled enclosure offsets the presence of abrasive dust in the plant.

The Century Electric combination of a complete motor line (over 10,000 types, from one-twentieth to 400 horsepower) and a national sales organization whose exclusive interest is in motors, assures you of getting the right motors for your needs. If you have a motor question, contact your nearby Century sales engineer or your authorized Century motor distributor.

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

60-13

DSC ECON-O-BRITE STRIP

helps widen your manufacturing margin on nickel-chromium plated steel parts

WHAT ECON-O-BRITE™ IS

ECON-O-BRITE™ is DSC Accutronic® STRIP with our improved Regular Bright Finish for nickel-chromium plating purposes. It is suitable for applications requiring eye-appeal and reliable job-performance—especially where overall costs are closely budgeted.

FIVE WAYS ECON-O-BRITE™ CUTS COSTS

1 Our Regular Bright Finish carries no price "extra"

2 DSC customers dispense with inter-leaving—a sizable cost saving

3 DSC customers report that our deep-rolled brightness and close-grained surface requires scarcely any preparation for plating and also facilitates superior plating results

4 LEVEL GAUGE and EVEN TEMPER—recognized user benefits of DSC Accutronic® STRIP—give you fast, steady, trouble-free stamping and roll-forming operations

5 LEVEL GAUGE enables you to reduce your product's average unit weight

HOW YOU CAN JUDGE ECON-O-BRITE™ FOR YOURSELF

First let us give you the complete story on this performance-proved production material and show you samples *before and after plating.* Then, if you say so, we can evaluate with you the requirements of one of your pet jobs and furnish a sample lot for you to run under your own operating conditions, without any obligation on your part.

As a starter, call your nearest DSC Customer "Rep" or write: DETROIT STEEL CORPORATION, BOX 7508, DETROIT 9, MICHIGAN.

Customer Satisfaction — Our No. 1 Job

Performance Proved

Steel — The Bargain Wonder Metal

DSC® **DETROIT STEEL**

Flat Rolled and Wire Products

Detroit Steel Corporation—General Sales Office, Detroit 9, Michigan
Cable Address DETROSTEEL—New York

Customer "REP" Offices in Principal Cities

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Speak Up for Business

On Feb. 13, we attended an all-day conference in Washington at which President Kennedy, Vice President Johnson, and members of the cabinet met with 800 leading businessmen.

The ostensible purpose was to create a warmer and more co-operative feeling toward the new administration.

President Kennedy stressed three areas of common concern: Economic growth, plant modernization, and price stability.

Far from being natural enemies, he said, government and business are necessary allies. For example, he said, the drop in corporate profits in 1960 also caused a loss in federal revenues of more than $3 billion—enough to pay for the federal share of all antirecession, health, and educational proposals for the next fiscal year, with enough left over to start closing the missile gap.

Mr. Kennedy's acknowledgment that the government needs a strong and prosperous business community was crystal clear.

Yet that acknowledgment has been contradicted time and again by the events of the last few weeks.

For example, a weak investment incentive tax proposal has been substituted for the revision of restrictive plant and equipment depreciation allowances.

The Herlong-Baker tax reform bill, applying to both individuals and corporations, is getting little or no serious attention.

Labor costs will rise further in line with the new $1.25 minimum wage law when skilled workers demand restoration of usual wage differentials.

At the same time, industry is warned that it cannot offset increased wages and other costs with higher prices.

The administration may also discourage plant investments abroad, although that is the only way many companies can compete in foreign markets.

Such unjustified harassment, even though it may be indirect, will continue unless management becomes more articulate.

It needs to get its story across to plant workers, to people in local communities, and to its representatives in Washington.

Only profitable, free enterprise can keep this nation free and prosperous.

Management needs to speak up for business!

Irwin H. Such

VICE PRESIDENT-EDITORIAL

McKAY DIE SHEAR LINES CUT MORE THAN STEEL. The most economical and efficient shear lines in operation today, they are being used by dozens of leading metal producers, fabricators and warehouses to slash shearing costs. Here, McKay Sales Manager Joseph F. Lyden, Jr., and M. G. Slaney, Building Division Manager, The Parkersburg (W. Va.) Rig and Reel Company — one of the nation's fastest growing manufacturers of pre-engineered metal buildings — examine panel sections cut to length by the high speed McKay Die Shear Line in the background.

This is McKay

Photo by Arnold Newman

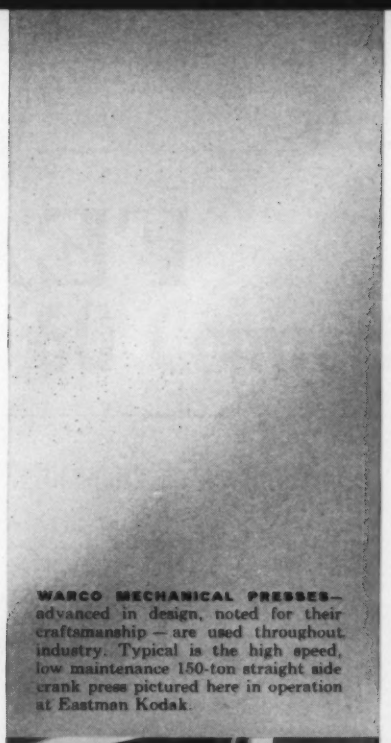
Machine....

a recognized leader in the development and manufacture of high production metal processing equipment!

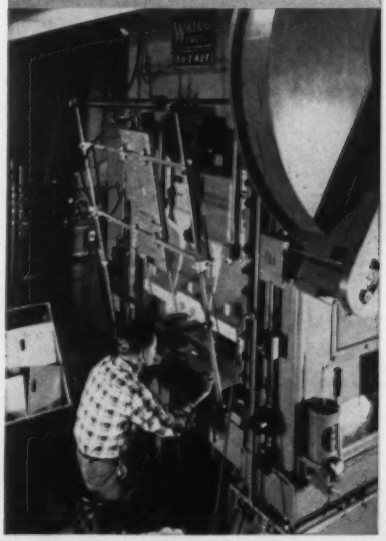
If you fabricate metals and are caught in the "profit squeeze" you'll want to know more about McKay Machine.

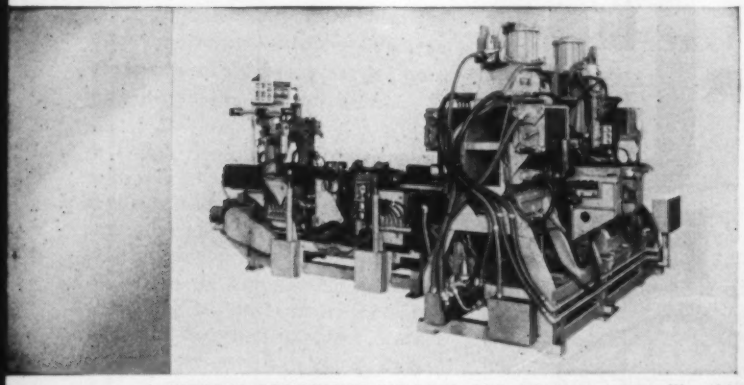
It was McKay Machine that pioneered automated integrated production lines, and it is McKay Machine that is today a leader in this field. We have conceived and produced complete lines for the manufacture of building panels, aircraft and missile sections, appliances, cabinets and components, automotive bodies and parts, and farm equipment—lines that are completely automated from *raw material to finished part or product.*

Whatever you make, if it requires metal handling, feeding, slitting, shearing, stamping, welding or forming, it's just good business to acquaint yourself with *McKay Packaged Production Lines*—high speed production equipment engineered to work in unison—with one-source responsibility from start to finish. Write for literature to *The McKay Machine Company, Youngstown 1, Ohio.*



WARCO MECHANICAL PRESSES—advanced in design, noted for their craftsmanship—are used throughout industry. Typical is the high speed, low maintenance 150-ton straight side crank press pictured here in operation at Eastman Kodak.

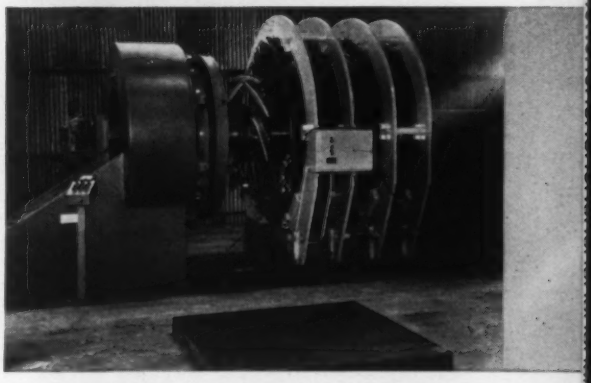




FEDERAL RESISTANCE WELDERS AND WELDING LINES, like this multi-gun combination spot and projection welder used by Hotpoint on their range production line, can be found in the plants of leading metalworking firms the nation over. Individual units, or complete resistance welding lines, are engineered to specifications by McKay's Federal-Warco Division.

LOOK TO

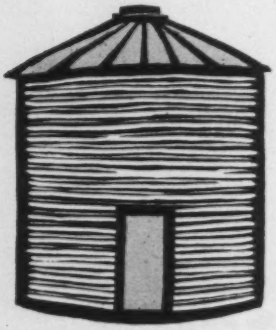
McKAY McK MACHINE



BERKELEY-DAVIS AUTOMATIC ARC WELDING MACHINERY produced by Berkeley-Davis, Inc., a subsidiary, is highly popular in the aircraft, rocket, automotive and appliance industries. The rocket body welder pictured here is working at Aerojet General, subsidiary of General Tire and Rubber Company.

WHAT FEATHERS ARE TO A

TI-CO® IS TO A



on the farm, and wherever **protection** against corrosion is required.

INLAND TI-CO® GALVANIZED STEEL SHEETS

INLAND STEEL COMPANY
30 West Monroe Street, Chicago 3, Illinois

Sales Offices: CHICAGO • DAVENPORT • DETROIT • HOUSTON • INDIANAPOLIS
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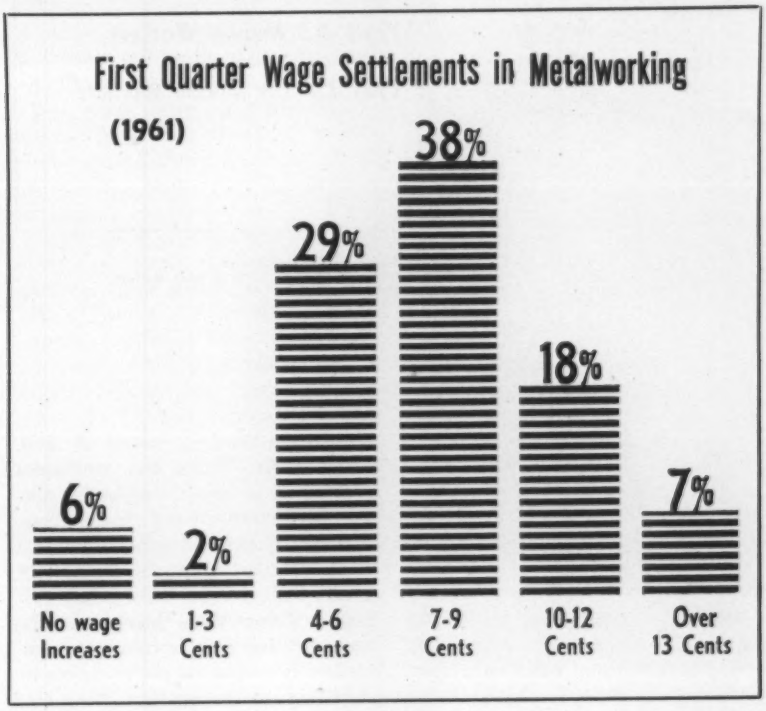
INLAND STEEL

1961 Bargaining Shapes Up . . .

Patterns Parallel '60 Contracts



LABOR settlements this year and last are as much alike as project houses. The basic structures are nearly the same; variations show mostly in the trimmings.

The blueprint: The "style" of settlements during the first quarters of 1960 and 1961 was 7 to 9 cents (see chart). Deferred increases appeared in 45 per cent of new contracts. They were followed in popularity by new or revised provisions for insurance and pension plans.

The recession has been an ally for most management negotiators. One said: "Bargainers for union locals have displayed more latitude in departing from big industry patterns." Brighter business prospects might bring harder bargaining in the second half.

• **Tough Bargaining** — Settlements with no increase figured in about 6 per cent of the metalworking contracts negotiated during the first quarter this year—up about 1 per cent from the comparable period of 1960. The big push for no increases, and even decreases in wages, started last October, says Ray Vacha, industrial relations director, Associated Industries of Cleveland (AIC). Because of business conditions, 14 AIC client companies have held the line on wages and killed cost-of-living (C-O-L) clauses in labor contracts.

"Some settlements included decreases in direct wages," Mr. Vacha says. One, with an international union, amounted to 10 cents across the board. Mr. Vacha comments: "Employees are more sophisticated about economics—they know that foreign competition can steal their jobs."

In some cases, unions have refused to take a cut in wages, and companies have gone out of business. American Forge & Socket Co., Pontiac, Mich., has closed its doors after 50 years of operation. A few years ago, the company employed 600 to 700 workers. This spring, employment was down to 60. American Forge had paid extremely high rates because its workers had high seniority and operated on a piecework basis. The average worker was getting more than $3.50 an hour. Early in the spring, the company's management asked the workers to take a cut; the workers refused—result: Closed doors.

• **The Hard Line**—Buckeye Brass & Mfg. Co., Cleveland, threatened to close its plant by June 1 if employees didn't accept a pay cut. The company will continue operations because a local of the Allied Industrial Workers agreed to co-operate with management to promote production efficiency and signed a one year contract extension with wages and fringes unchanged, said Alan S. Dale, company vice president and general manager.

In another instance, Eaton Mfg. Co., Cleveland, negotiated a one year contract that changed work rules to increase productivity and reduced wage costs 16 cents an hour for 550 workers at its Reliance Div. in Massillon, Ohio. The company contended that competition from imported industrial fasteners made the Massillon operation uneconomical. The union accepted the pact after the company announced plans to move the division to a new plant in Roxboro, N. C. The company

Cost-of-Living Clauses Cover Fewer Workers*

1958 4.3 Million Workers

1959 4 Million Workers

1960 3.3 Million Workers

1961 2.5-2.8 Million Workers**

Source: Bureau of Labor Statistics.
*Major contracts covering 1000 or more workers.
**Estimated.

has shelved plans for construction at Roxboro.

• **No Patterns**—James I. Poole, an attorney with Foley, Sammond & Lardner, Milwaukee, says: "As seems true in every period of recession, management negotiators are trying hard to avoid pattern bargaining and are centering attention upon their own situations. Many companies are trying to eliminate cost-of-living provisions. This clause has become a sore point because business conditions have worsened without any appreciable reduction in price indexes."

Figures from the Bureau of Labor Statistics show the gradual demise of the escalator clause. At the beginning of 1961, an estimated 2.5 million to 2.8 million workers were to be covered by automatic C-O-L provisions in major (more than 1000 worker) agreements. In 1958, 4.3 million workers were eligible for the escalator increases. A big drop came last year, when railroads and electrical equipment makers discontinued the provisions.

• **Fringe Changes**—The Bureau of National Affairs Inc., Washington, reports that insurance plans were added or altered in 31 per cent of contracts negotiated during the first quarter, a drop of 1 percentage point from the last quarter of 1960.

AIC's Mr. Vacha sees companies picking up a larger and larger portion of insurance costs. In one case, a company granted what amounted to 7 cents an hour per worker for insurance coverage, rather than giving a direct wage increase. The company felt that in the next negotiation it would be easier to clamp a ceiling on the amount going into insurance benefits rather than granting a direct wage increase this year and being hit for another next year.

Kenneth Porter, research director, Employers Association of Detroit, sees a fair number of companies changing to the Community Health Association insurance program sponsored by the United Auto Workers. It has become competitive with Blue Cross in the Detroit area. It has lower rates and may foster continuance of employee contributions to the insurance program.

• **Holidays Added**—The eighth paid holiday is showing up in more and more contracts. Some companies are allowing Good Friday, the day after Thanksgiving, or combinations of half days (the eves of Christmas and New Year's), to make the eighth day. Some provisions put the day in "float," and it can be taken at the discretion of the bargaining unit or employee group.

• **Length of Contract**—Mr. Poole observes that there "is a great tendency toward the two year contract, even in the smaller companies. I think this is perhaps the most significant trend of the time." Reason: The bargaining process constantly becomes more involved, complex, and time consuming, he says. "Few companies, and few unions for that matter, can afford to go through this process every year. When they do, they have little energy left for other matters," he comments.

In the Pittsburgh area, contracts are being negotiated in the two to three year category, with two years the minimum. The advantages of longer contracts, up to five years or more, were cited to STEEL by a number of labor consultants. They mentioned: Labor peace, operating continuity, predictability of labor costs, cost stability, long term purchase agreements, less buildup of grievances that are usually filed when a contract is about to expire.

• **Disadvantages**—Under long term labor contracts, pressure between a union and company can build to high levels, creating tremendous animosity and ill feeling by the time bargaining day rolls around. Other factors: Market and economic conditions may change during the contract tenure, and it is difficult to renegotiate the contract to care for those exigencies. Also, the changes may be detrimental because companies commit themselves to costs, prices, and purchase contracts that are difficult to alter.

• **Seniority** — Several firms have won modifications in seniority provisions. Under one change, they can reduce operations to a four day workweek without resorting to costly, complicated layoff and recall procedures.

• **Servance Pay**—The Bureau of National Affairs notes that severance pay provisions figured in 8 per cent of the first quarter settlements in 1961, a rise of 3 percentage points.

One Pittsburgh lawyer says: "A single company plant has no business entering into a contract that requires severance pay. That sort of thing makes bankruptcy a luxury." He fights that situation every time it comes up and comments: "There are no chances for intra-company transfers."

How to Beat the Russians: Act Like We Want to Win!

COMPETITION for world markets is Russia's greatest potential threat to the U. S. To beat her: We must get over our complacency and start acting like we want to win.

That's the warning three observers of the Soviet system made before a seminar of the American Society of Tool & Manufacturing Engineers at Columbia University, New York.

Panelists included: H. Russell Beatty, president, Wentworth Institute, Boston; Harold Mansfield, special assistant to the president, Boeing Airplane Co., Seattle; and Prof. Carl F. Kayan, Mechanical Engineering Department, Columbia University.

• **The Challenge** — The Russian people work hard and have good motivation, says Mr. Beatty. "The pacemaker is the hero of the plant. He's accepted by the team." There is a group compulsion, rather than a slave driving pressure, behind the efforts of Russian workers, he believes.

"We have a group pressure to restrict effort and output." Russian unions have but one purpose: To help management increase productivity. "These differences in philosophy," concludes Mr. Beatty, "can cause us trouble."

• **Foreman an Engineer**—One of the Russian plans for increased manufacturing efficiency is to replace all "practical foremen" with graduate engineers—the young engineer will spend his first three or four years after college in such a slot.

Under a new program, Russian engineering students will serve two years in a plant as a workman, work another eight months as a technician, then spend six months writing a thesis—all in addition to the regular classroom and laboratory work in a traditional engineering school.

Last year, the Russians graduated about 117,000 engineers. And for every engineer, they turned out two technicians. It's estimated that 28 per cent of Russian college students study engineering.

• **Business as Usual**—The reason so many are inclined to disregard the Soviet challenge is that it is some years away, says Mr. Mansfield. But if we continue to underestimate it, the Russians might eventually win the competitive struggle.

The tipoff will be how well we meet the current challenge of competition from the rejuvenated European nations. If we do it by quotas, tariffs, or "Buy American" measures, we will incapacitate ourselves. "If, on the other hand, we meet the European competition, we will be ready to meet the Soviet challenge when it comes," says Mr. Mansfield.

Professor Kayan spells out the Red challenge this way: The Russians are "dour and drab but at the same time defiant, determined, diligent, and dedicated." They have a goal, and they're determined to reach it, he says.

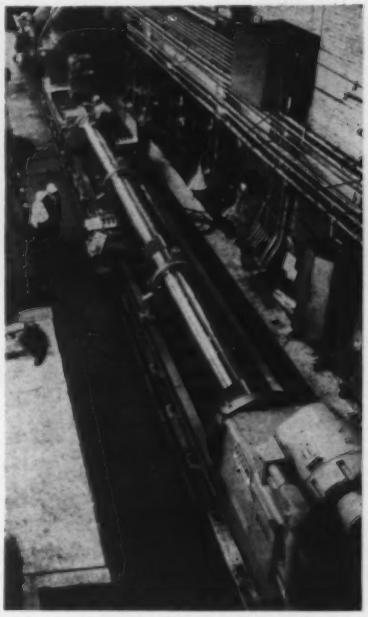
• **Where We Stand**—Today, we're 10 to 20 years ahead of the Reds. But they're coming up fast, and they have a goal—something we lack! The Soviets want to be the nation that "tools the world." If we let them, it will be defeat by default.

NLRB Sets Fast Pace In First Quarter of '61

CASE ACTIVITY at the National Labor Relations Board during the first quarter of 1961 continued at high levels. Filing of unfair labor practices rose 22 per cent over the last quarter of 1960—the greatest increase since the first quarter of 1959. Unions filed 37 per cent of the cases, employers 13 per cent, and individual employees 50 per cent.

Representation cases filed in the January-March period of 1961 showed an increase of 26 per cent over the previous quarter. Unions won 59 per cent of the 1352 collective bargaining elections vs. 55 per cent in the last quarter of 1960.

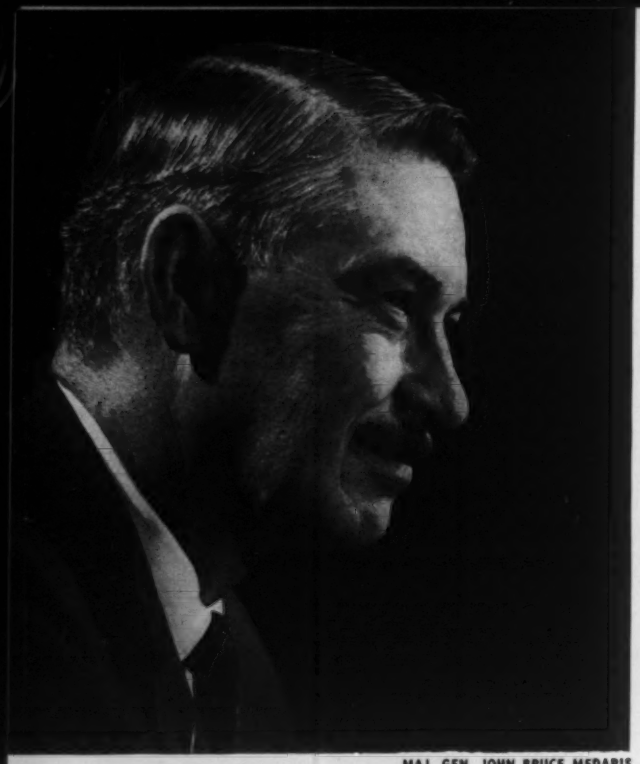
The five member board issued 713 decisions and orders, up 16 per cent from the previous quarter, representing a 76 per cent increase in issuance of unfair labor practices cases.



Double Head Lathe Turns Jumbo Pieces

THIS double head lathe is turning a 54,000 lb, 45 ft long, walker shaft forging. It will end up in a large machine for coal mining that's being built by Bucyrus Erie Co., South Milwaukee, Wis.

Machining time for the part is about 200 hours and more than 13,000 lb of steel will be removed from the rough forging. Finished weight of the shaft is 41,000 lb. The machine (at A. Finkl & Sons Co., Chicago) is capable of turning a forging up to 65 ft long and pieces up to 7 ft in diameter. Two forgings can be handled simultaneously. The machine is equipped with electronic controls for feeds, speeds, and threading. It has no lead screw. Lathemaker: Farrel - Birmingham Co. Inc., Rochester, N. Y.



MAJ. GEN. JOHN BRUCE MEDARIS

Lionel Highballs

1959

Seasonal Toy Line . . .

Operating at Loss . . .

Management Shakeup

1960

New President . . .

Acquires New Companies . . .

Shows Net Profit

1961

Higher Sales . . .

New Products . . .

New Markets

1962

Continuing Diversification

& Integration . . .

More Sales in More Markets

WITH Maj. Gen. John Bruce Medaris (USA-ret.) at the controls, Lionel Corp., New York, is roaring down the tracks of diversification. Lionel's 60th birthday, in 1960, was the year of the big switch.

The toy trainmaker entered the year as basically a single line company competing (at a loss) in a seasonal market. It emerged 12 months later as a profitable company, diversified in operations and markets, and with groundwork established for further growth and diversification.

• **New Management**—A group headed by Roy M. Cohn, of McCarthy hearings fame, assumed operational control of Lionel in 1959. As a lawyer and member of the founder's family, he had been consulted by some of the large stockholders who were disturbed about declining earnings.

The new management group took a close look at the company and found some solid underpinning: One of the top consumer names in the world; plant and equipment worth $20 million; a good business reputation; a large share of the model railroad market (in a growth period for toys and leisure goods); no long term indebtedness; a group of highly competent and dedicated employees; an inviting potential in electronics.

• **Believes in Diversification** — General Medaris was brought in to take command as president and chief executive officer in August, 1960. By the end of the year, three companies had been acquired:

1. Anton Electronic Laboratories Inc., Brooklyn, N. Y. (soon to be renamed Lionel Electronic Laboratories). It designs and manufactures radiation counters, contamination detection systems, connectors, precision potentiometers, and solenoids.

2. Intercontinental Mfg. Co. Inc., Garland, Tex., producer of large airframe assemblies, rocket and missile motor casings, booster motor parts, and engine containers.

3. Telerad Mfg. Corp., Flemington, N. J. (now a Lionel division), maker of microwave instrumentation, antennas, and components such as attenuators, mixers, and waveguides.

• **Two and Two Make Five**—Techniques long associated with Lionel formed the basis for expansion. As toy trainmakers, Lionel personnel had years of experience in miniaturization, powder metallurgy, injection molding of plastics, and the production of precision electronic and electrochemical instruments and mechanisms. The company sold to government and industry as well as commercial markets. Considerable special machinery (such as coil winders) had been developed by Lionel engineers.

to New Markets

In two world wars, Lionel produced navigational equipment and communications components. Today, the company's hardware is aboard many space satellites and weapons systems.

Lionel now has the knowhow to design, develop, and manufacture components, subsystems, systems, and assemblies—ranging from subminiature motors and vacuum tubes to massive airframe structures. As a result, the company is landing prime contracts and subcontracts.

"We believe in the type of acquisition where two and two make five . . . not where the acquired company simply becomes another producing entity," says General Medaris. "I'm a builder, not a maintainer."

• **Red to Black**—Even at this early date, Lionel's efforts are paying off. During 1960, sales were 23 per cent higher for all divisions than they were in the previous year. Nearly half was military and government business.

Sales volume almost doubled, reaching $31,386,877. Net income was $1,145,536 compared with a net loss of $1,203,782 in 1959.

General Medaris thinks 1961 sales will reach $40 million.

• **New Products, Markets**—An additional half million dollars was budgeted for research and development this year. Target: More broad commercial markets.

Example: A fractional horsepower motor not much larger than your thumb. It has high torque, instantaneous control, and goes in forward or reverse. It can be used as a control mechanism for numerous devices, commercial and military.

Remote control and electromagnetic devices have been used on Lionel trains for many years. New commercial and industrial uses have been found for modifications, particularly in the electrical appliance field. One, a relay, has been adopted by a television manufacturer for remote control of the volume on TV sets, reports Joseph L. Bonanno, vice president, chief engineer, and treasurer.

Among the most recent developments by Lionel's new subsidiaries is Anton's currency recognizing device, capable of adaption for vending machines, banks and other money handling enterprises. Other new Anton products: A transistorized, radiation survey meter and a nuclear power monitor.

• **Trains Keep Rolling**—Lionel has no intention of deserting the toy business. Mr. Bonanno says three scientific building sets will be marketed later this year: Electronics engineering, plastics engineering, and weather forecasting. In addition, a series of six famous inventor's sets will be offered. They are do-it-yourself kits for youngsters—an early printing press, the electric light, steam turbine, telescope, telegraph, and telephone.

• **Powder Metal**—Although Mr. Bonanno has seen a steady decrease in the use of metal in toy trains (they are being replaced by plastics), there has been renewed interest in powder metallurgy. Two reasons: With newer, more versatile presses, the company is developing stronger parts from powder metals; the price of stainless steel powder is down, and other powder metal prices have held firm.

• **Experience Paid Off**—General Medaris finds much similarity between his new job and the Army—he was commanding general of the Army Ordnance Missile Command which developed the Redstone. "The chief difference," he says, "is [watching] the bottom line (profits) of the balance sheet. Short of war, there's no way to measure profit and loss in a military operation."

He did learn about the value of reliability. "It was sometimes necessary to purchase 1000 electromechanical devices to get 200 that would stand up for high grade missile application. There's no sense in that. We have to give the buyers a guaranteed quality and specification . . . this is the direction in which we will go," he emphasizes.

He's also introducing the project manager technique, which he used in the Army, to handle system or subsystem contracts at Lionel.

The project manager is assigned complete responsibility for fulfillment of the contract. He reports directly to the president. A team of engineers is assigned to the project, based on the skills required for research and development, product engineering, and electronic, electrical, electromechanical, and mechanical product engineering. Quality control engineering is operative

"AS INDICATED by our 1960 acquisitions, we are looking toward more sophisticated areas of new technology," says Roy M. Cohn, chairman and great nephew of Lionel's founder, Joshua Lionel Cowen. Mr. Cohn headed a group that gained operating control of the company in 1959.

in all phases of design and production, and reports independently.

Those assigned to a task force continue to function in their regularly assigned areas—which gives the task force member the reinforcing help of his own group.

General Medaris points out these advantages of the technique: It's economical; decision time is shortened; support is doubled; reinforcing help can be brought up quickly in trouble areas.

The general is also concerned with strengthening the company's reorganized marketing divisions: "So we can sell the products that come from integration."

• **Clear the Track**—Lionel has no intention of becoming content with the status quo after its present companies are working together smoothly.

"We are vigorously investigating several other companies and anticipate additional growth through acquisitions," states Mr. Cohn. A special merger and acquisition committee, headed by board member David B. Chase, is studying potential acquisitions.

IBEW Pact Takes New Tack To Help Displaced Workers

UNDER a new labor contract, a manufacturing company will bear the cost of retraining workers displaced by equipment the company sells. The company: International Good Music Inc., Bellingham, Wash., producer of radio broadcasting equipment.

It signed a labor contract with the International Brotherhood of Electrical Workers that establishes a fund for the training and retraining of radio station employees displaced as a result of the installation of automated equipment and program services made and sold by International.

The retraining clause was negotiated on this principle, stated in the agreement: "Automation will create more income and wages than it destroys, while creating new channels of employment and destroying old ones," and that "it is reasonable to establish a fund to lessen the shock to those employees displaced by automation."

• **Big Contributions**—The company will put 5 per cent of its gross profits into the fund. A displaced employee—disc jockeys will be the principal group affected—can draw from the fund to retrain himself for other employment. The company contributions will be augmented by federal funds available for re-education under the Smith-Hughes Act, the George-Barden Act, and the National Defense Education Act of 1958.

The training fund will be administered by a single trustee, who will have no connection with the company or the union. The displaced employee will not receive cash, but he will get a training course, and the school will be paid directly from the fund.

Says Rogan Jones, IGM president: "Re-education of employees displaced by automation is really a form of profit sharing. Having practiced this in my own business for a number of years, I believe that this is a step in the same direction. Good management never finds that good wages are a bar to profitable operations.

"We hope this will have the same effect."

Gordon M. Freeman, president of IBEW, asserts: "We do not feel that the worker should bear the full impact of automation. We think that management and society, which stand to benefit from technological change, have responsibility to the worker who is directly affected."

WOLFSBURG, GERMANY

Volkswagen:

AN AMERICAN visitor to the Volkswagenwerk here might wonder if he were touring a plant in Detroit, Chicago, or Cleveland.

Towering Danly and Clearing presses stamp body panels from steel sheets bearing the trademarks of U. S. Steel, Bethlehem, and Republic.

Tennant sweepers scoot up the aisles, dodging Clark lift trucks. Thor power tools tighten bolts on the assembly line. You see Ransburg electrostatic cleaners and Schweitzer equipment in paint booths.

Throughout the plant, machine tools and equipment bear such familiar names as McKay, Acme-Gridley, Gisholt, Norton, Gardner-Denver, Detroit Broach, Bullard, Gleason, LeBlond, Cleveland Hobbing, Michigan Tool, and Micrometrical.

At nearby Hannover, where engines and the microbuses are built, you'll find many more. An addition to the engine plant, where the new, more powerful VW engine will be built, calls for 280 new tools. Fifty will be U. S.-made. Transfer lines in the new department will tie in U. S.-made Ex-Cell-O units with German-made Gehring machines.

• **"We Buy Your Tools"**—German guides are eager to point out that Volkswagen has purchased more than $50 million worth of U. S. machine tools in the last three years. The visitor need not coax to learn that the company is buying $700,000 worth of U. S. steel and magnesium each month.

The guide may then volunteer that Volkswagens are sold in 118 countries and "maybe more."

Obviously, Volkswagen is one of the most international of metalworking companies. One employee brags: "Soon, we'll be as international as Coca-Cola."

• **Lebensraum**—What Hitler failed to achieve in living space by con-

As International as Coca-Cola

quest, Volkswagen is gaining by industry. More than half the VW cars and nearly three quarters of the station wagons and microbuses are exported.

The U. S. is easily VW's best customer. One in five cars produced is sold in the U. S. Volkswagen is far and away the most popular imported auto in the states and is gaining. During the first quarter of 1961, Volkswagen accounted for 52.5 per cent of our auto imports—vs. 32 per cent in all of 1960 and less than 20 per cent in 1959.

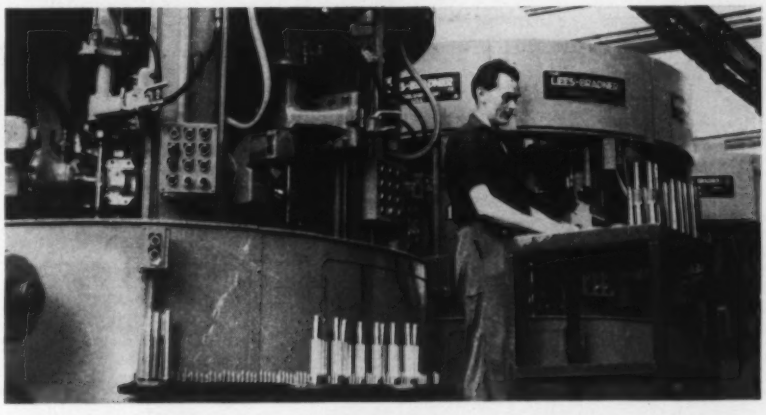
VW people, from President Heinz Nordhoff down, preach and practice international trade. Materials are imported from any country that can supply them at competitive prices and quality. Steel sheets come from Holland, Belgium, and Austria, in addition to Germany and the U. S. Much magnesium comes from Norway.

• **Deliveries Help Us**—VW officials admit that one reason for the large purchases of U. S. machine tools and other equipment in recent years results from the heavy backlogs of German and other European builders. Deliveries on European machine tools often take 18 to 30 months. U. S. tools can be obtained in a shorter time. And with their industry running at capacity, the Germans will pay the higher prices for U. S. tools.

What will happen when the boom in German machine tools levels out and deliveries are shortened? Volkswagen engineers say they will continue to look to U. S. builders for many of the larger and more complicated special tools. The lower prices asked for standard European tools will favor the domestic product.

Higher wage costs work against U. S. equipment builders, but the Germans, whose wages have increased 300 per cent since 1948, believe the labor cost differential will lessen.

STEEL's Editor Walt Campbell, right, discusses conveyorized painting facilities



Revaluation of mark helps make purchase of American-made equipment more attractive in Germany

"Made in U. S." machine tools and heavy presses like the above help VW turn out more than 4000 vehicles a day

Representative Boggs Leads Fight Against Bill Taxing Foreign Subsidiaries . . . How Proposed AID Will Work

REP. HALE BOGGS

OF ALL THE REVENUE measures President Kennedy has suggested to Congress, the proposed tax on foreign subsidiaries of U. S. corporations stands the best chance for passage.

Washington observers feel that the balance of payments deficit and the increased foreign competition are helping to increase support for the bill. The House Ways & Means Committee is hearing witnesses this week in connection with the proposal. The hearing is far from one-sided.

The Treasury Department is strongly behind the bill for several reasons: It hopes the revenue will help offset that lost because of the proposed investment incentive plan (STEEL, Apr. 24, p. 100); it says foreign tax havens now permit U. S. firms unfair deferral of taxes on their investments abroad; and it cites the need for more domestic investment rather than foreign.

An important member of the Ways & Means Committee, Rep. Hale Boggs (D., La.), is leading the battle against the tax proposal. In the past, he has championed more U. S. investment abroad and more trade. He admits that the battle against the bill will be a tough one.

● **BALANCE OF PAYMENTS**—Representative Boggs agrees that the value of the dollar must be protected, but he charges the Treasury exaggerates the deficit danger in our balance of payments. The unfavorable situation in 1960, he says, was caused mostly by the movement of short term capital overseas because of better interest rates there. He believes that movement of capital has been "substantially eliminated" and predicts European prices for exported products will be rising faster than U. S. prices. Result: Less danger from foreign competition.

● **TAX HAVENS**—Certain countries (Switzerland, for example) have low tax rates on foreign corporations in their countries. A U. S. tax haven operation might consist of a firm with a manufacturing subsidiary in Germany with a largely paper subsidiary in Switzerland holding the patents under which the German operation is carried out. High license fees can be set up for the patents so that a large part of the German subsidiary's profits are taken by the Swiss subsidiary. Representative Boggs points out that Germany, under such a plan, is not gaining tax revenue from the U. S. subsidiary within its borders. If the administration killed the use of the Swiss paper subsidiary, the German operation would be taxed at the high German rates and little additional revenue would return to the U. S., because the U. S. firm could deduct what it pays in foreign taxes from its U. S. tax bill.

● **U. S. INVESTMENT**—U. S. firms go abroad for other reasons than to avoid U. S. taxes, the congressman argues. Example: To better compete for foreign markets. The Treasury's argument that these firms would invest at home rather than overseas applies only to products produced overseas for resale in the U. S.

Finally, the congressman believes all investment should have profit as its test. He wonders if investment overseas should not be encouraged rather than discouraged, so that private enterprise would carry the burden rather than the U. S. taxpayer through the vast foreign aid program.

He feels continued U. S. private investment in the Free World, including Japan and Western Europe, is necessary to increase total Free World strength. He notes that a firm which decides not to invest in Germany because of the loss of tax deferral has no particular reason for investing the same money in Africa, where deferral will continue. German and African investments are made for different reasons.

New Foreign Aid Agency Proposed

Creation of one agency to run the $4 billion foreign aid program is welcomed by industry representatives in Washington. The consensus: "Now, we will know the right man to see when a project comes up our companies are interested in." The new Agency for International Development (AID), if approved by Congress, will take over the International Cooperation Administration and the Development Loan Fund.

Most important new step is the President's proposal to establish a five year, $7.3 billion fund out of which long range development projects would be financed.

State Department officials point out Congress will be able to review the use of the five year funds every year, although they will not require the annual appropriation needed for regular foreign aid money. Long range funding will allow the underdeveloped nations to make solid plans; U. S. industry, in turn, will know what sales it can count on in the programs. (Underdeveloped countries can get long term commitments from Japan and Western Europe, so some business has been lost by U. S. industry.)

here are a few IDEAS

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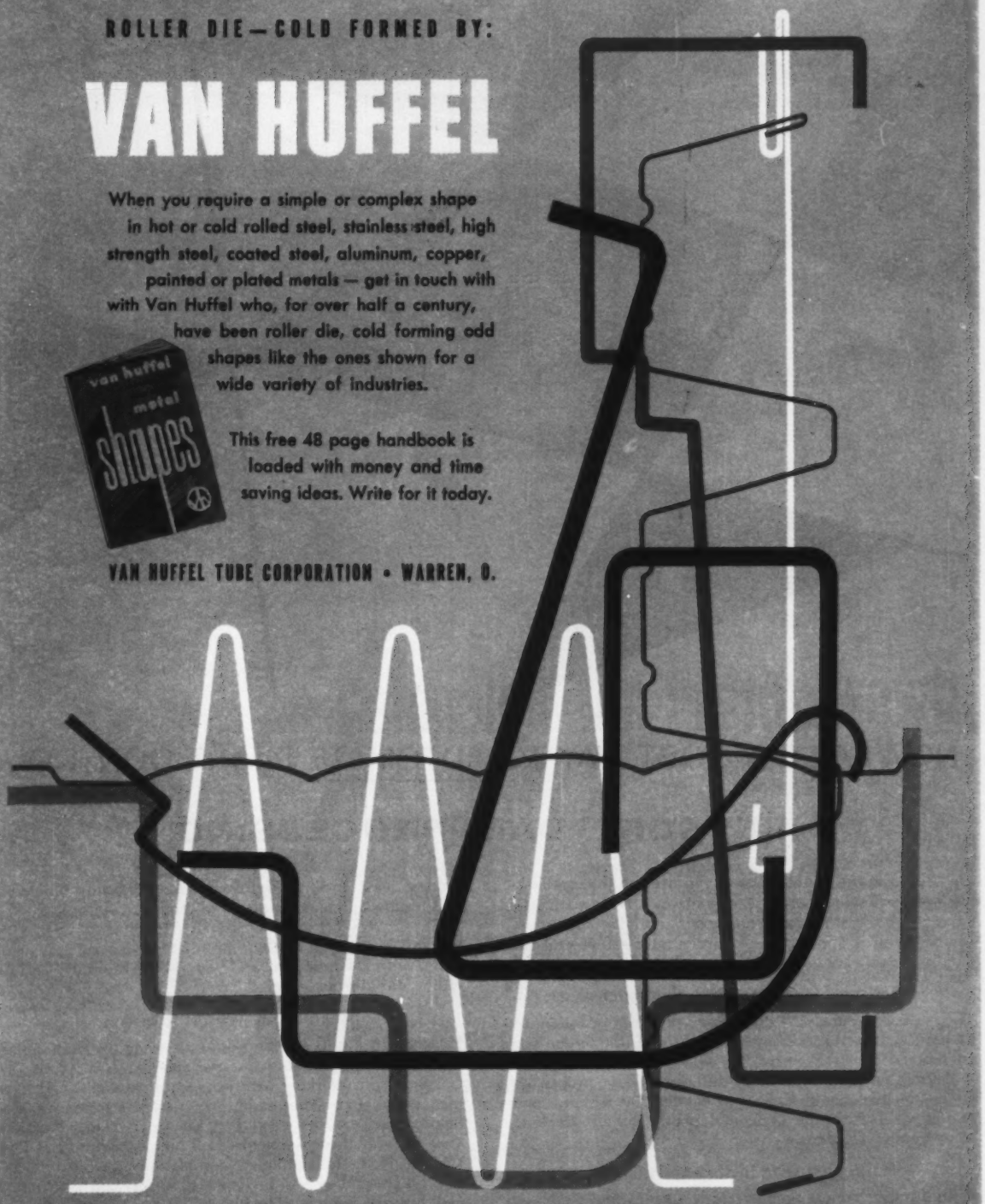
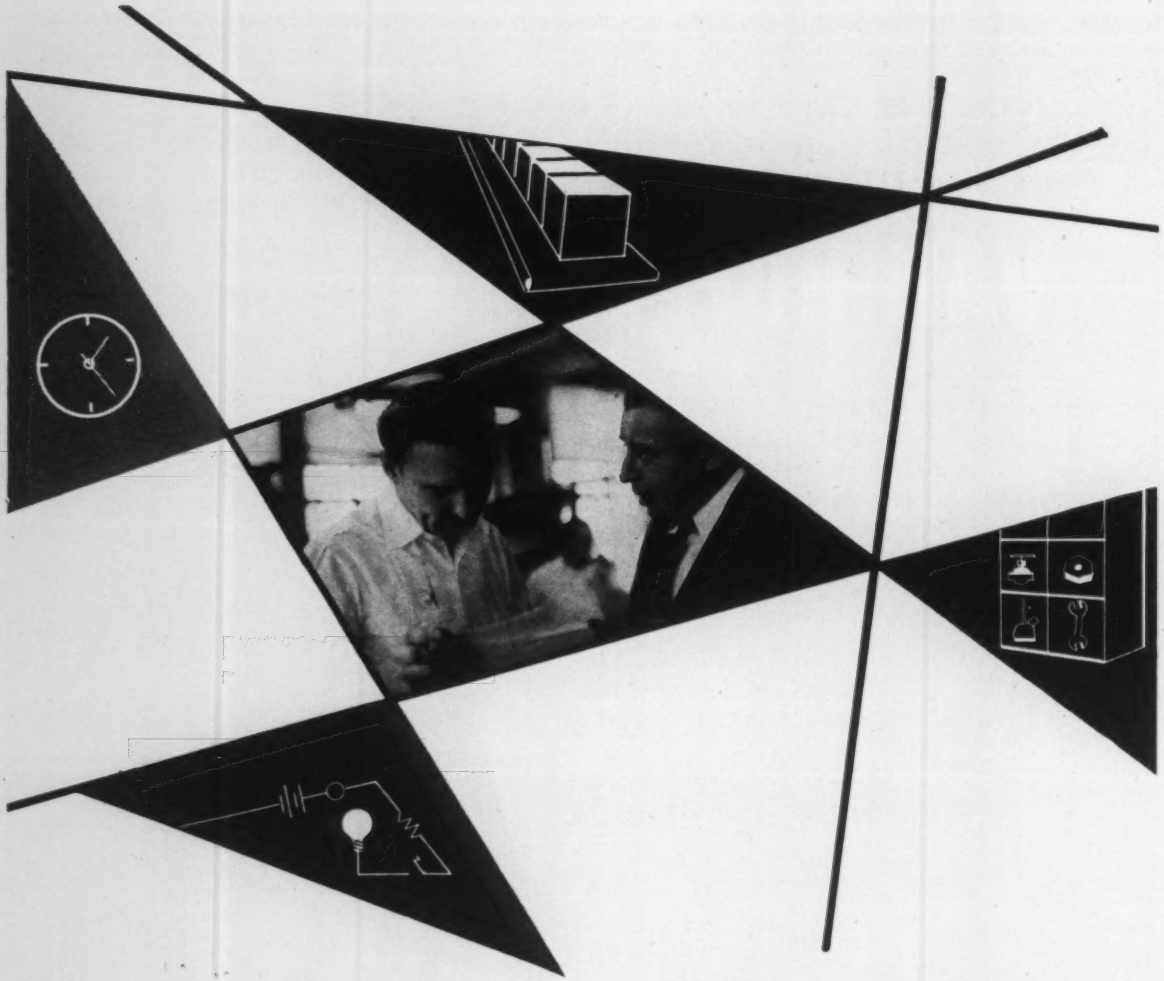


WHERE IDEAS TAKE SHAPE IN METAL



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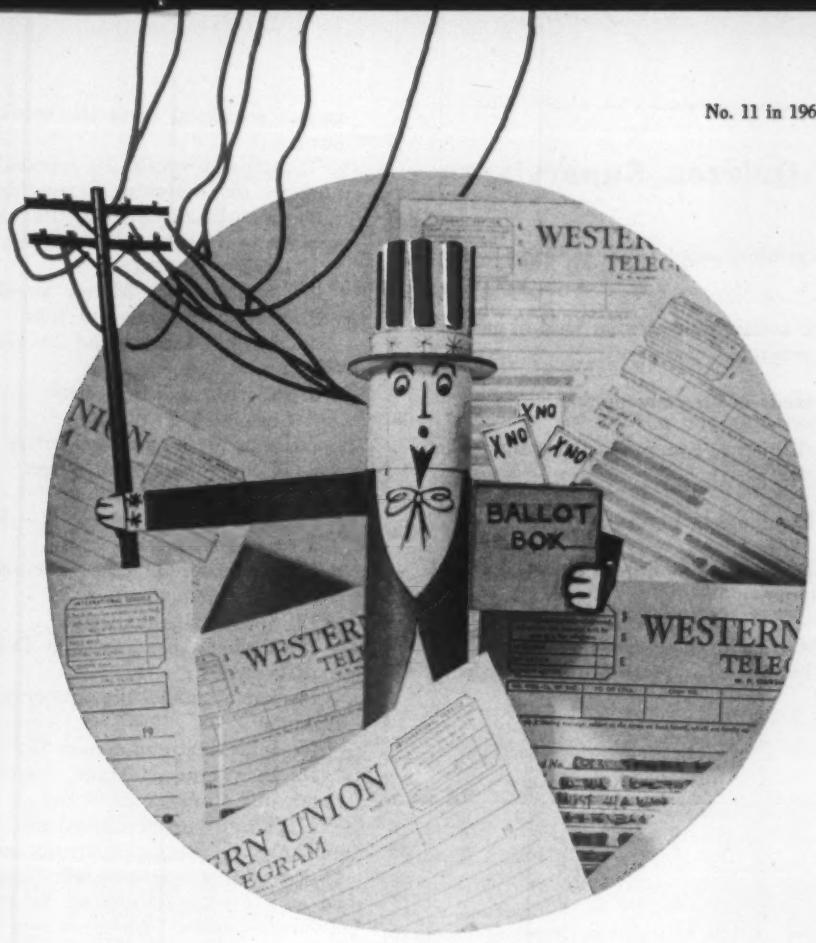


Campaign for Profit Growth

LAST FRIDAY, some 15 executives from steel service centers met for breakfast at 7:30 a.m. in a Cleveland hotel.

Their June 2 gathering was one in a series of 26 throughout 1961 that will teach them more about economics and politics.

Why are they meeting?

Robert G. Welch, executive vice president of the Steel Service Center Institute, Cleveland, answers this way: "We usually think of our day-to-day problems as economic ones, yet the solutions to a large extent are political . . . the government is a majority stockholder in every one of our companies . . . the federal government takes 52 per cent of our profits. Also, state and local government representatives are in there voting on virtually every decision we make. Sometimes, their interest is an additional 10 per cent or more. The votes of government representatives may be cast in Washington or your city hall, but they might just as well be cast in our board meetings. That is where the effect lands."

And how are our "government directors" voting?

In the 86th Congress, 57 senators and 218 congressmen consistently voted in opposition to business.

"Isn't it about time we staged a proxy battle?" asks Mr. Welch.

His way of preparing for the fight is the course in economics and politics for institute members. Fourteen of 24 chapters have held at least one series of courses so far.

Education is needed because of thinking like this: Half of a group of nonunion employees recently queried believed you can "boost wages regardless of productivity and let government set prices." One-third of the high school students quizzed believed "government should regulate profits." Only eight of 90 university students knew precisely what was meant by the "Bill of Rights." Only four had heard of a right-to-work law. The 90 estimated the national debt at between $1 million and $500 billion.

Don't smile. The lack of knowledge is not limited to students or hourly employees. Republic Steel Corp. was convinced it needed a training program when a survey of 4000 of its supervisors showed the

Republic Steel Quizzes Supervisors

Before any training in political action, here are some typical scores:

- **87 per cent didn't have a clear idea of what kind of government the Constitution sets up.**
- **60 per cent believed labor is the only productive factor.**
- **59 per cent believed all increases in productivity should be paid out in higher wages.**
- **45 per cent believed Communism needs no capital.**
- **34 per cent believed the Electoral College is a special school for congressmen's children.**

After training, one test showed an improvement of 70 per cent, a second of 39 per cent. The over-all improvement in knowledge and opinion was 50 per cent.

discouraging results tabulated above.

Background for Politics

Mr. Welch recommends a course in basic economics before you tackle political action because "businessmen haven't stopped to think our economic system through lately." How can you sell the merits of free enterprise to government people when you can't explain what the system is?

Both phases (economics and politics) can be treated as one continuing course. The Steel Service Center Institute prefers the program developed by the U. S. Chamber of Commerce. You can use either or both parts. Thus far, the political section has been given to more than 100,000 participants in 1609 communities throughout the 50 states by various groups.

Many other groups have similar programs, including the National Association of Manufacturers. R. C. Sollenberger, executive vice president of the Conveyor Equipment Manufacturers Association, believes that the job of improving the political awareness of members may be one of the most important tasks an association can perform. Companies have also built programs tailored to their needs. Republic Steel's is a notable example.

Mr. Welch finds that he has to do a careful job of selling even a good program. His method is to visit a society chapter and give a talk on the plan. He does a little advance planting, then asks for people to sign up for both segments —17 weeks of economics and nine weeks of political action. The solicitation of enrollments via memo is usually a failure.

The SSCI course starts at 7:30 a.m. and winds up by 9:30 or 10:00 a.m. Attendance runs about 85 per cent, which is unusually high for adult education sessions.

The Chamber of Commerce course on economics includes "echo tapes." Typical is a 10 minute tape: One voice argues the need for higher wages. Another voice tries to refute the argument but is unsuccessful. Participants then take a crack at answers. (They read a pamphlet on the topic in advance.)

Next, the participants discuss the answers for an hour or more. Then another tape is played—a well known economist gives the correct answer.

The Chamber calls its economic program the American Competitive Enterprise Economy, and the 17 sessions bear these titles:

1. Mystery of Money
2. Control of the Money Supply
3. Money, Income, and Jobs
4. National Income and Its Distribution
5. Progress and Prosperity
6. Sustaining Prosperity
7. Demand, Supply, and Prices
8. Prices, Profits, and Wages
9. Why the Businessman?
10. How Competitive Is the American Economy?
11. Understanding the Economic System and Functions
12. Spending and Taxing
13. Taxing, Spending, and Debt Management
14. Labor and the American Economy
15. Individual and Group Saving
16. International Trade, Investment, and Commercial Policy
17. The Ethics of Capitalism

The pamphlets on economics cost $5 per set. A tape costs $85. Needed also is a special manual for the discussion leader. Materials can be obtained from the Business Relations Department of the Chamber at 1615 H St. N.W., Washington 6, D. C., or from the Steel Service Center Institute at 540 Terminal Tower, Cleveland 13, Ohio.

Ready for Action

Next comes the Action Course in Practical Politics. It contains information about everyday politics. Like the economics segment, it's designed for 12 to 20 persons and consists of nine, 2 hour workshops held weekly. The participant gets a set of eight pamphlets, each devoted to one important aspect of politics:

1. The Individual in Politics
2. Political Party Organization
3. The Political Precinct
4. The Political Campaign
5. Political Clubs
6. The Political Leader's Problems
7. Political Meetings
8. Businessmen in Politics

A ninth session, for which there is no pamphlet, features comments by local politicians.

The case study technique is used. The workshops are discus-

Republic Offers 15 Films on Political Science

Each movie lasts about 20 minutes and features an expert on the subject. The films are sequential and unique in the field.

1. Why Politics?

Raymond Moley, journalist and political scientist, discusses our need for political information and understanding.

2. The Meaning of Democracy

Dr. E. E. Schattschneider, professor of government at Wesleyan University, develops the basic premise of democracy—its deep respect for the individual and for his personal freedoms.

3. Our Federal Constitutional System

Dr. Ivan Hinderaker, professor of political science, University of California at Los Angeles, shows that our form of government is the result of compromise and the fear of centralized political power.

4. The Role of the Supreme Court

Dr. David Fellman, professor of political science at the University of Wisconsin, analyzes the history, power, and judicial procedures of our highest court.

5. An Introduction to Public Administration

Dr. Lynton Caldwell, professor of government at Indiana University, gives an overall view of public administration and compares its problems with those of business.

6. Citizen Responsibility for Good Government

Herbert Miller, former executive director of the Tax Foundation, develops three political and economic yardsticks that can be used to measure the effectiveness of government.

7. The Web of Taxes

W. B. Boyer, vice president and treasurer of Republic, covers the problem of individual and corporate taxes and their effects on incentives and investments.

8. Characteristics of the Electorate

Dr. Claude Robinson, chairman of Opinion Research Corp., analyzes the political composition and behavior of the U. S. electorate.

9. The Electorate Tides of the Future

Samuel Lubbell, author and analyst, discusses the broad sociological changes taking place in our society and their importance to U. S. politics.

10. How Our Two Party System Operates

Dr. Alfred de Grazia, professor of government at New York University, describes the key functions which political parties perform in our system.

11. Waging a Campaign and Winning an Election

Robert Humphreys, former campaign director for the Republican National Committee, shows how campaign strategy is developed.

12. Pressure Groups in Action

Dr. Marbury Ogle, professor of government at Purdue University, shows the need for pressure groups in our system.

13. A Look at Local Government

Dr. Charles Adrian, director of the Institute for Community Devlopment and Services at Michigan State University, describes the conflicts that arise among groups and between the central city and suburbs.

14. State Political Organization and Legislative Procedures

Dr. Gary Brazier, assistant professor of government at Boston College, describes the important process of making and passing legislation at the state level.

15. Getting into Local Politics

Dr. Norton Long, professor of political science at Northwestern University, discusses political participation at the local level.

sion sessions; there are no lectures. Each is built around a subject covered in one of the pamphlets. The participants read them in advance —together with the related case problems—and come to the meeting prepared to speak up.

You can get the materials from the Chamber or SSCI. The discussion leader's manual for politics costs $12 and includes case problems and other paraphernalia for 20 participants. A set of the eight pamphlets is priced at $6.

The Chamber's economic and political courses have been widely admired. Not even organized labor has found anything to criticize in them. They are carefully nonpartisan, objective, and functional.

The Tailored Program

By necessity, the Chamber's political course had to be designed for as broad a coverage as possible. It deals in the common denominator aspects of the subject.

If you want a political course tailored more closely to your circumstances, Republic Steel's may help you. Here are Vice President H. C. Lumb's suggestions for political education programs in industry:

1. The program must have educational depth and give the participant educational background, understanding, and tangible political goals.

2. The program must have objectives and systematic evaluation. Republic's objectives are to raise the level of understanding of government structure, political processes, and political values; encourage active participation in politics; encourage participation in civic and community affairs; encourage participants to become informed about and influence local, state, and national legislation; get high schools, colleges, civic groups, and companies interested in the political area and furnish them the approaches, materials, and methods Republic has found successful.

3. The program must be objective.

4. The program must provide for modern teaching materials and competent conference leaders.

5. The program should be scheduled in the individual's home community. Republic runs its courses off company property and on the participant's time. This puts the responsibility on the individual and lets him participate with other citizens of the same area whose combined and concentrated political efforts will be more effective than if they were diffused over many political divisions.

6. Republic's programs are designed for the future as well as the present. It developed a series of 15 films, each running about 20 minutes, that cover the entire field of political science (see the accompanying description of them).

Every session starts with a film. A discussion of an hour or more follows. It's led by instructors chosen and trained from among Republic employees.

In the first round last year, 2500 Republic people (supervisors and their wives) took the course. About 1200 are enrolled in a second series. The dropout rate has been only 15 per cent, low for adult education.

Republic rents the films at $10 per week per film, or will sell them for $125 per reel. If you are interested, write to: L. C. Michelon, co-ordinator of communications, Republic Steel Corp., Republic Bldg., Cleveland.

The Results

Republic agrees with Mr. Welch that economic education is as important as political training. The company did that in the 1950s for all its supervisors. It's still doing it via other means, such as economic newsletters mailed six times a year to almost all workers. Tests show that employees have retained the economics and have continued education on their own. Odds are that the same will occur with the political program.

The economics part of any program tells why we need a more favorable climate for business at national, state, and local levels. The political portion shows how we can get that climate—whether the issue involved is as everyday as zoning or as unusual as depreciation reform.

Has political training borne fruit? Of the 3700 who have taken or are taking it at Republic, several hundred have taken active part in politics for the first time; 40 have run for office.

Eighty people at Clevite Corp., Cleveland, volunteered to take the national chamber course; as a direct result, five ran for office for the first time.

Specifically, here's what happened to a number of businessmen:

Joseph C. Kilborn, vice president of Petoskey Mfg. Co., maker of diecastings, Petoskey, Mich., successfully ran for city council after taking a political action course.

Carl Mann, in the planning department of Aluminum Co. of America's Vernon, Calif., plant, became head of his political party's precinct organization in Montebello, Calif.

William C. Russell, vice president and general manager of Joy Mfg. Co.'s St. Louis plant, was elected alderman in his community.

Ray Holbrook, patent solicitor for Monsanto Chemical Co.'s Texas City, Tex., plant, was elected a member of the state board of education.

A prize example is Herman T. Schneebeli, a successful Williamsport, Pa., businessman, who was elected to Congress and is now a member of the important House Ways & Means Committee.

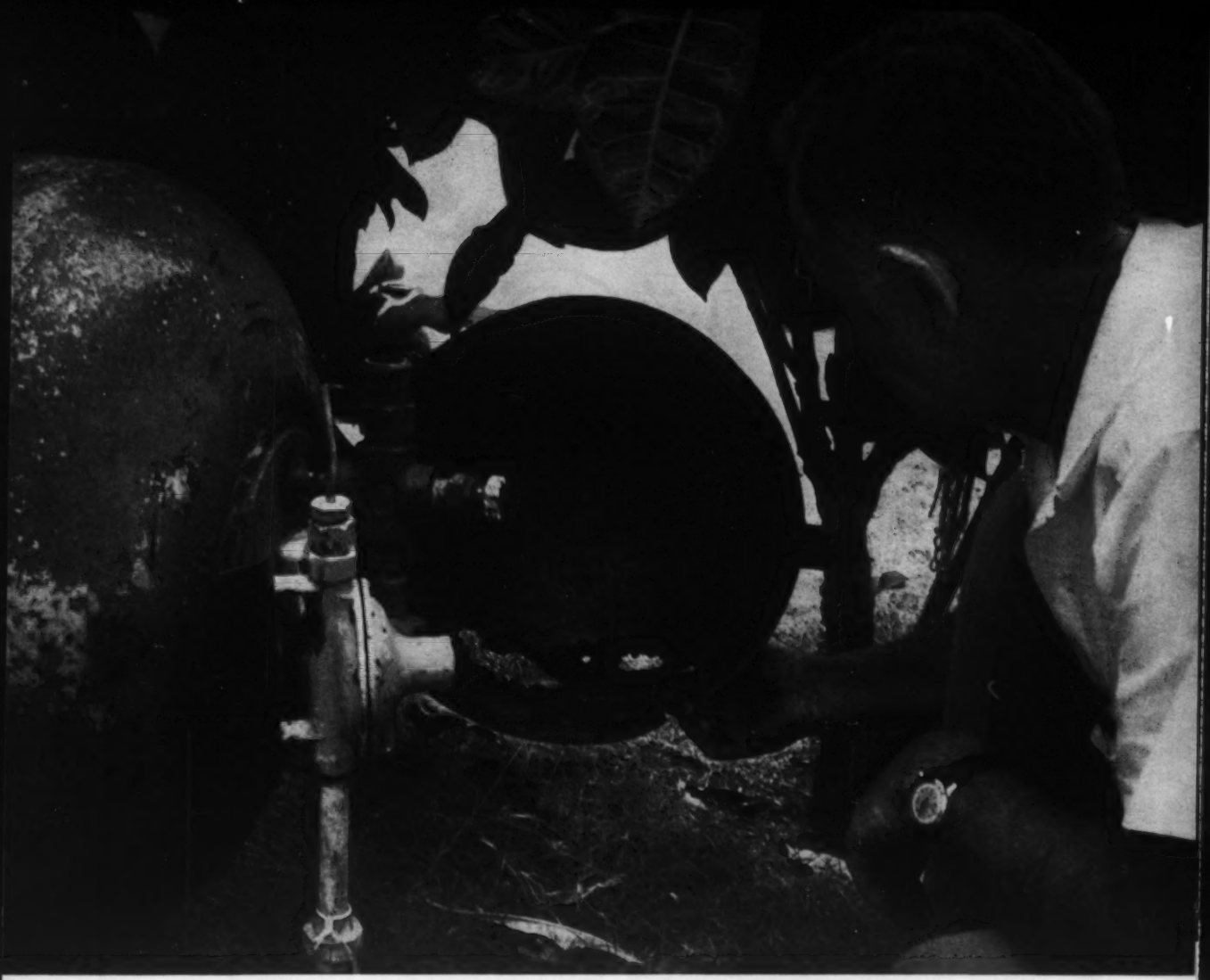
Probably even more important than the relatively few metalworking managers who have successfully run for office are the many more who are working anonymously in politics for the first time, trying to win a better climate for business.

As someone has pointed out, politics is largely blood, sweat, and volunteers.

PLAN FOR PROFIT GROWTH

Manage for It

On June 19, STEEL will show why management must plan for profit growth and how it can set good goals. For a free copy of any or all articles in this series (appearing biweekly since Jan. 16), write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



This tough corrosion problem licked by M&T spray-on plastisol coating

Over 6000 LPG tanks in a severe location were at stake in this case. The tanks are installed outside for domestic gas service, are coated for appearance as well as protection. But coatings suffer constant high humidity, windy salt atmospheres, sweating of tank surface and expansion and contraction due to refrigeration effect as the liquid contents turn into gas.

In the worst locations, tanks would have to be replaced after a year. Even in moderate locations, severe corrosion would take place prematurely. Requirements called for coating to protect with minimum maintenance for five years.

Exhaustive testing showed that Unichrome Super 5300 Coating — an M&T sprayable vinyl plastisol — had the answer. Having the best combination of properties, it could survive and block corrosion in locations where rust chewed into metal within months. It is a good thermal insulator and controls sweating. It has the toughness to resist physical damage hazards, the resiliency required by temperature change, the stability in sunlight.

Unichrome Plastisols apply by all usual production methods, not only in the heavy duty industrial-type protective applications but also for product finishing. You can also get M&T spray-on vinyl finishes for use on patterned metal, or for texture on smooth metal.

M&T has multi-plant facilities to deliver consistent quality, in quantity, on schedule. Avail yourself of this kind of service and coating performance. Send for bulletin, or an M&T Coating Specialist.

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METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey
In Canada: M & T Products of Canada Ltd., Rexdale, Ontario

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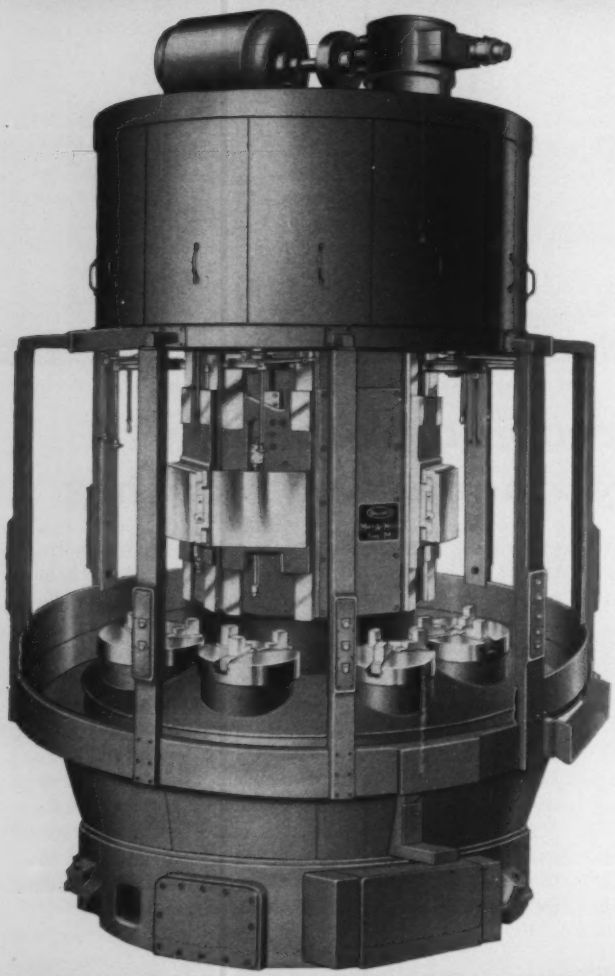


NEW Bullard Mult-Au-Matic Type "M"

Contrary to the general upward trend in the cost of new plant production equipment, The Bullard Company is offering the *new* Type "M" Mult-Au-Matic at a price which is *lower than competitive methods.*

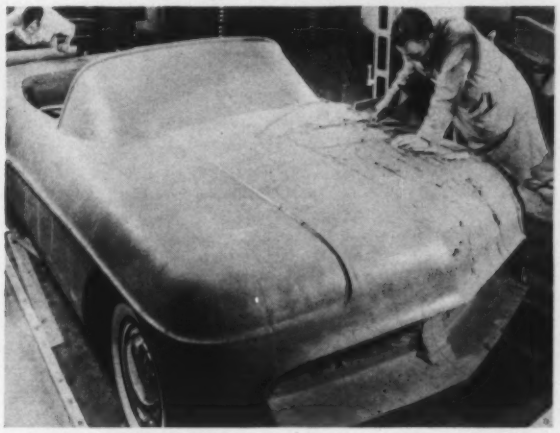
Designed and built according to exacting Bullard standards, the *new* Type "M" Mult-Au-Matic incorporates many new features of rigidity, accuracy and productivity which have made this machine famous the world over.

For complete information on the *new* Bullard Type "M" Mult-Au-Matic, call your nearest Bullard Sales Office or Distributor or write to

The Bullard Company, Bridgeport 9, Conn.

Today's Car . . .

An average of 22 lb of plastics replace about 150 lb of metal



1970 Car . . .

Will 60 lb of plastics replace more than 400 lb of metal?

Metalmen Face Challenge of Plastics

"CONCENTRATE on stressing the performance of your own material and skip the propaganda on the shortcomings of other materials."

That's the challenge Ford Motor Co.'s J. R. Forrester Jr. hurls at producers of materials competing for a share of the automotive parts market. As supervisor of materials development at Ford's Research & Engineering Center, Mr. Forrester hears a lot of sales pitches. STEEL asked him how metalmen can improve their chances when they are competing with plastics—their per car weight has been doubling every five years since 1950. He has five suggestions:

1. Set your sales sights on parts that give you the opportunity to build up a case for your metal. It makes it easier for automotive people to make direct comparisons among materials. Nonferrous producers generally do this, but steel companies sometimes overlook the peculiarities of part requirements because they are used to dealing with large tonnage shipments.

2. Concentrate on parts that can be redesigned to your material and do a better job than a competing material. Producers of plastics learned the art of redesigning for the strength of their materials and simpler fabricating techniques from the aluminum people. They talk about the final piece cost, not about raw materials prices. Too often, metal fabricators can't get out of the rut of thinking about the "traditional" way of designing and making a part.

3. Give the disadvantages as well as the advantages of your material. "You can't help but admire a person if he gives you the weaknesses of his own material. He'll probably come off better than if he tries to ignore them," Mr. Forrester declares. Generally, physical properties involving expansion coefficients, modulus of elasticity, hardness, strength, and temperature resistance are plus points. Processing costs and weight make for problems in competition against plastics.

4. Make every effort to improve the physical properties and lower the costs of your materials when you're going after applications that are hotly competitive. Good example: Allegheny Ludlum Steel Corp.'s recent development of a special stainless (MF-1) for muffler parts.

5. Don't give up on a part until you've considered a "combination" approach. Good example: Vinyl coated steels for glove box doors, station wagon tail gates, and Thunderbird consoles.

• **Plastics Will Gain**—While Mr. Forrester feels that producers of metals have been doing a more intelligent selling job in the last year, he points out that use of plastics in autos can't help but grow. There's no question about their suitability for many parts now made from steel or nonferrous castings. "Plastics have the advantage of being relatively new, so their price will come down as volume picks up," he predicts.

Adds Mr. Forrester: "The decision on which material to use for

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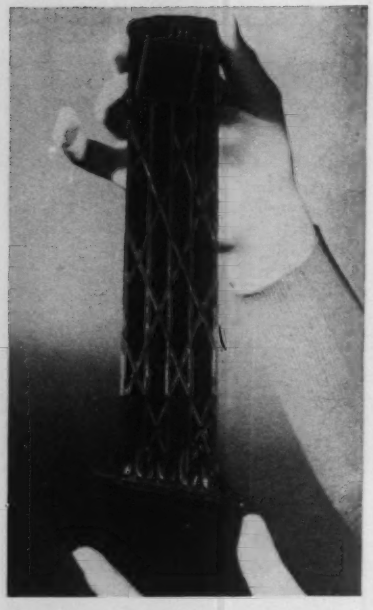

Plastic Accelerator Pedal Cuts Weight, Cost

This self-hinging accelerator pedal is molded in one piece from polypropylene. It'll be used on 1962 Mercurys, replacing a two-piece, steel insert rubber pedal.

Developed in Ford's product study engineering office, the plastic version weighs 2.75 ounces. The steel model weighs 12 ounces. Cost difference is estimated at 10 cents per car, in favor of plastic.

In tests, Ford flexed the pedal 1 million times at normal temperatures without failure. It also cycled it 100,000 times at temperatures ranging from minus 40° F to plus 125° F.

a part may change from one year to the next, depending on material costs, or improvements in physical properties or manufacturing methods. If you're on your toes, you can recover some parts that you may have lost the year before while still maintaining the parts you now have."

• **Know Your Competition** — It's also important to thoroughly understand the strengths and weaknesses of plastics so you can compete intelligently, thinks Mr. Forrester. Several other materials managers in the industry have told STEEL they're amazed at how little some metalmen seem to know about plastics and their properties.

Plastics have more than 250 automotive applications. About 2 per cent of the country's plastics production goes into automobiles vs. 20 per cent of our annual steel output. The Society of Plastics Industries figures the 22 lb of plastics used in the average car today replace 150 lb of metals by volume. The figure doesn't include applications where plastics have replaced glass, fiber materials, or where they have been used a long time in items like steering wheels.

"The physical properties of plastics have been improved to the point where they can be molded or formed to exact shapes with little or no waste. They offer lightness, corrosion resistance, impregnated color, and easy replacement. Plastics can also be vacuum metallized at a fraction of the cost of plating steel," summarizes William P. Gobeille, manager of American Motors Corp.'s plastics operations. He figures the average per car use of plastics will reach 60 lb or more by the end of this decade. That doesn't include uses in finishes, seat covers, or similar applications.

Common Types of Plastics

While there's a whole family of polymers (ABS materials) that have long been used for parts like crash pad covers and some functional parts, most of the competition today centers on the five "rigid" plastics (acrylic resins, fluorocarbons, nylon resin, polyethylene, and acetal resins).

• Typical uses for the acrylic resins are lenses, reflectors, and instrument panel bezels. They might be used for car grilles some day. Acrylics have good optics, are easily machined, colored or metallized, but they have a relatively soft surface.

• Fluorocarbons account for only a few ounces of parts in cars, although E. I. du Pont de Nemours & Co. Inc., Wilmington, Del. has forecast a 200 per cent increase annually for its Teflon. This costly plastic has excellent antifriction qualities, high impact and temperature resistance, and is highly resistant to liquid corrosives. It's used for friction coatings, shaft seals, bushings, and a few small bearings. Future applications could include nonlube ball joints. The material competes with some copper alloys and bearing steels.

• Nylon resin is broadly used and moderately priced. It's molded into a host of small knobs, gears, and oil pump bushings. It's tough, can withstand high temperatures, and is self-lubricating. It's generally more costly to mold and competes with powder metal parts, machined steels, and some diecastings. Future uses may be radiator fans, oil pumps, timing gears, and fuel lines.

• Polyethylene is molded into side seat shields, heater ducts, fasteners, and plugs. In film forms it's bonded to steel and used for kick panels. It can be used for wiring insulation. Although it's solventproof and flexible, it's hard to color coat and sometimes streaks or fades. Steel and aluminum stampings are big competitors.

• Acetal resins are less than two years old. They have been costly, but Du Pont has reduced the price of Delrin to 65 cents a pound. Instrument cluster housings, door and window handles are popular uses. Future applications may include hood releases, exterior trim parts, speedometer cable casings.

Polypropylene is a newcomer this year. It's being used for accelerator pedals and for defroster nozzles and radio grilles at Chrysler.

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,242
April	446,740	582,909
4 Mo. Totals	1,634,941	2,585,139
May		611,226
June		613,147
July		434,377
August		305,527
September		407,685
October		617,816
November		597,132
December		522,239
Total		6,694,288

Week Ended	1961	1960
Apr. 29	114,378	135,515
May 6	124,454	142,091
May 13	129,402	145,917
May 20	123,528	154,755
May 27	127,659†	142,359
June 3	90,000*	115,068

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

Ernst cuts steel costs to customers up to 10% with three new Wean Coil Processing Lines

Jim Moon, sales engineer of McKay Machine (above left), represents Wean Equipment Corporation in the Buffalo area. During a recent call on Ernst Iron Works, Division of Ernst Steel Corporation, Jim talked with Carl Grosse, Plant Superintendent, about the three Wean coil processing lines recently installed by this major metals warehousing firm.

According to Mr. Grosse, the Wean slitting, shearing and coil banding lines have reduced Ernst's handling, labor and scrap costs up to 10%. In addition to providing lower costs to Ernst's customers, this modern coil processing system helps this firm give fast service while easing inventory and supply problems through the purchase of standard size coils.

Equipped with modern, automatic controls, the Wean coil processing lines are operated by only four men and can handle 20,000 lb. coils, up to 54" wide and from .015" to .135" thick.

The McKay Machine Company, sales representatives for Wean Equipment Corporation to the metalworking and warehousing industries, will be able to assist you with complete engineering and technical information in planning your slitting and shearing requirements. Why not contact a McKay sales engineer to see how Wean coil processing equipment can help lower your costs.

THE McKAY MACHINE COMPANY REPRESENTS WEAN EQUIPMENT CORPORATION IN SALES TO THE METAL FABRICATING AND WAREHOUSING INDUSTRIES

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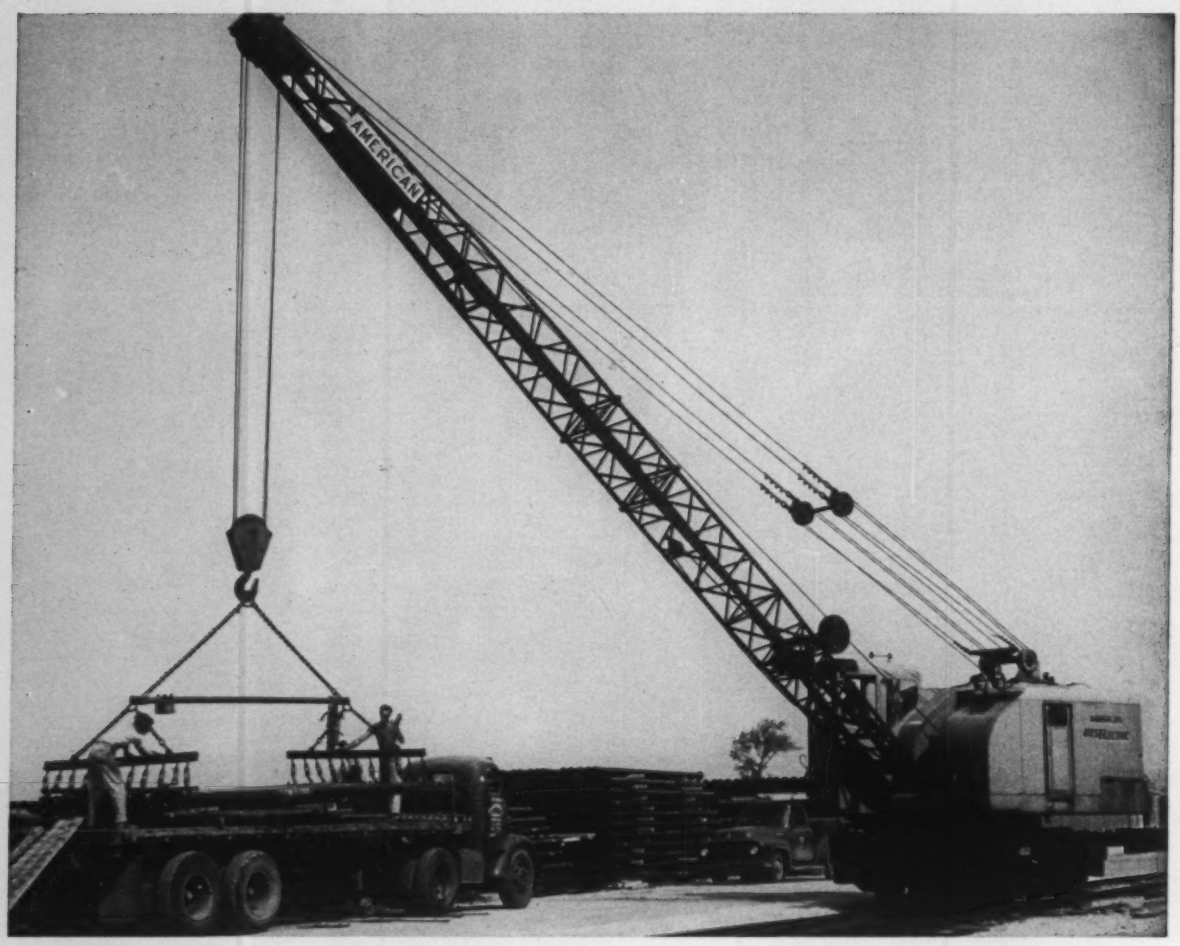

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AMERICAN DiesELectric® cranes can

repay their cost in as little as 5 years!

The reason: smooth-running power on rails. Today, more and more plants are finding it *their* answer to faster handling of materials at lowest cost. On AMERICAN DiesELectric locomotive cranes, each truck is powered by its own electric traction motor, eliminating some 58 wearing parts of mechanical-drive machines. From end to end these trucks are *specially engineered* for locomotive crane service.

The upper works of AMERICAN DiesElectrics revolve on a large circular path of heavy-duty conical steel rollers . . . giving far better distribution of weight than other designs. Load-handling is speeded by fast-responding graduated air controls that give the operator a true feel of the load. It all adds up to high production, and low day-to-day operating costs.

If your materials-handling lends itself to locomotive crane use, you will want to know more about the benefits of owning an AMERICAN DiesELectric . . . the most widely used locomotive crane in industry.

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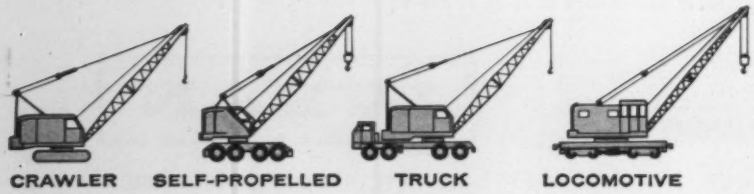

AMERICAN

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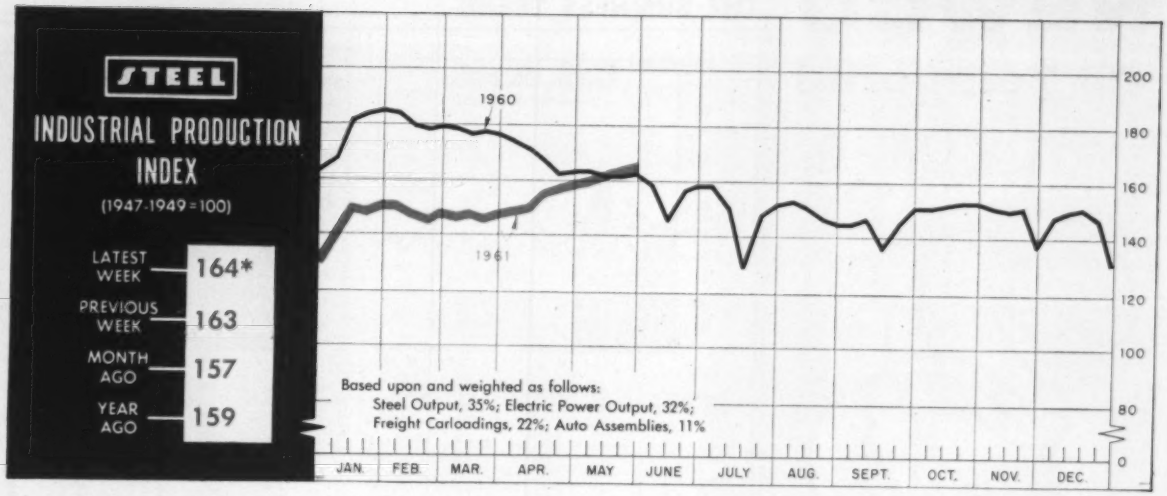

*Week ended May 27.

Economy Nearing Year-Ago Levels

FOR THE FIRST TIME since mid-November, 1960, STEEL's industrial production trend line is above the year-ago level.

Powered by rising trends in steelmaking, railroad freight carloadings, and output of electricity (see Barometers of Business below), the index rose to a preliminary 164 (1947-49=100) during the week ended May 27. During the corresponding week of 1960, the index read 159.

• **Don't Be Misled** — However, it should not be assumed that the production recovery over-all has reached the former peak established early last year. While there are indications that the total economy may be near the record height, industrial production probably won't reach that level until sometime in the second half.

Judging from the continued strength of STEEL's unadjusted index in May, the Federal Reserve Board's industrial production index will be at least 1 point (and possibly 2) above the seasonally adjusted April level of 105 (1957=100). Unless that figure is revised downward (some observers feel a 3 point rise in April was too much) the May total will be only 3 or 4 points below the near record level of May, 1960. If the index were to advance at the rate of just 1 point a month (slower than most recoveries), a new peak would be reached in November.

• **GNP Moving Ahead**—It is possible that the economy, as measured by gross national product, is already back to the record level of $505 billion (annual rate, seasonally adjusted). Assuming that February was the low point of the recession, GNP was probably moving ahead as the quarter ended. A rise of $5 billion to $6 billion this period from the rate of $499.8 in the first quarter would not be unusual in a recovery year.

• **Early Recognition** — In at least

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	2,080[1]	2,077	1,726
Electric Power Distributed (million kw-hr)	14,400[1]	14,352	13,572
Bituminous Coal Output (1000 tons)	7,750[1]	7,425	8,544
Crude Oil Production (daily avg—1000 bbl)	7,050[1]	7,061	6,815
Construction Volume (*ENR*—millions)	$400.0	$410.7	$389.1
Auto, Truck Output—U. S., Canada (*Ward's*)	159,920[1]	157,823	180,843
TRADE			
Freight Carloadings (1000 cars)	575[1]	568	640
Intercity Truck Tonnage (changes from year ago)	−0.9%	−2.8%	−4.8%
Business Failures (Dun & Bradstreet)	303	368	313
Currency in Circulation (millions)[2]	$32,001	$32,081	$31,684
Dept. Store Sales (changes from year ago)[2]	+6%	+17%	−1%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$29,233	$31,496	$25,068
Federal Gross Debt (billions)	$289.1	$289.0	$288.6
Bond Volume, NYSE (millions)	$28.2	$38.0	$26.2
Stocks Sales, NYSE (thousands of shares)	19,235	24,274	15,976
Loans & Investments (billions, adjusted)[3]	$112.8	$111.3	$102.9
U. S. Govt. Obligations Held (billions)[3]	$31.4	$30.3	$25.8
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	222.3	222.0	231.2
All Commodities[6]	118.9	119.1	119.7
Commodities Other than Farm & Foods[6]	127.8	127.9	128.4

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

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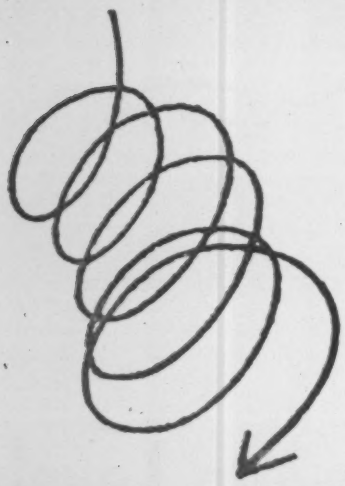
Oil Tempered



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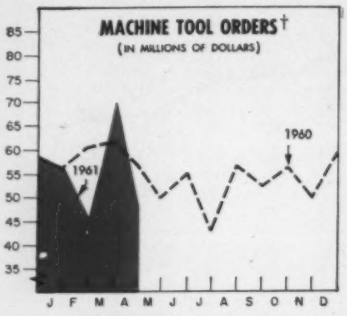
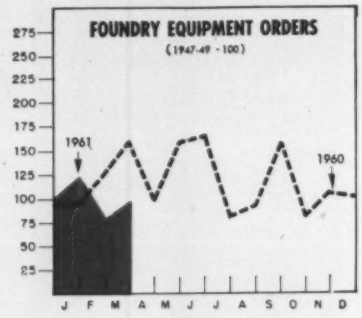
THE BUSINESS TREND





	New Orders (000 omitted) 1961	New Orders (000 omitted) 1960	Shipments (000 omitted) 1961	Shipments (000 omitted) 1960
Jan.	$56,100	$56,450	$45,500	$46,400
Feb.	46,400	60,600	45,650	51,950
Mar.	70,050	61,950	54,850	64,500
Apr.	47,900*	51,850	53,050*	55,100
May	.....	49,950	.....	56,350
June	.....	55,100	.....	63,100
July	.....	42,950	.....	51,300
Aug.	.....	56,850	.....	47,900
Sept.	.....	52,300	.....	53,950
Oct.	.....	56,200	.....	51,350
Nov.	.....	49,950	.....	48,550
Dec.	.....	59,000	.....	61,350
Totals	.....	$653,150	.....	$651,800

†Cutting and forming. *Preliminary.
National Machine Tool Builders' Assn.

	1961	1960	1959
Jan.	123.7	95.5	127.4
Feb.	81.8	128.6	237.1
Mar.	99.1	159.9	166.6
Apr.	....	97.9	154.3
May	....	159.0	157.0
June	....	164.8	125.1
July	....	80.0	110.7
Aug.	....	92.4	134.1
Sept.	....	158.1	131.3
Oct.	....	81.7	140.8
Nov.	....	106.5	131.2
Dec.	....	101.2	95.9
Avg	....	118.8	142.6

Foundry Equipment Mfrs. Assn.

Charts copyright, 1961, STEEL.

one important aspect, this recovery is already different from the other three postwar expansions. There was almost unanimous recognition of the fact that the economy had turned within a month or two after it occurred. This may be partially responsible for the unusually large amount of optimism for so early in an upcycle.

Sees Vigorous Uptrend

One of the more recent forecasts for all of 1961 comes from the Bureau of Business Research, Indiana University, which sees a rather sharp and vigorous upturn. It predicts that gross national product will increase more than $37 billion by the fourth quarter. Government expenditures will reach $55.5 billion (annual rate) by fourth quarter, up from about $54.5 billion in the first quarter.

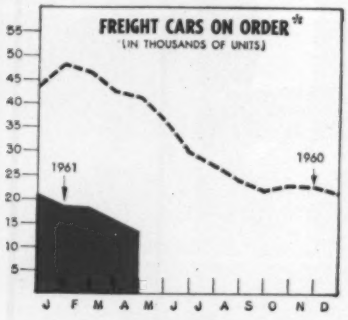
Plant and equipment are lagging, but the university economists say this sector will advance to a fourth quarter rate of almost $38 billion.

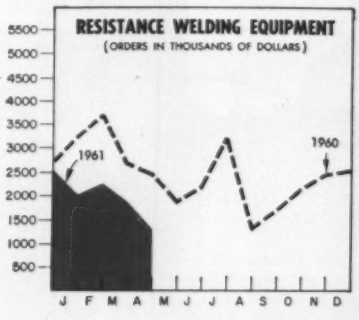
The outlook for residential construction is not as bullish. "To estimate that expenditures during the fourth quarter of 1961 (annual rate) will exceed $22 billion appears generous at the present time and would represent about a $3 billion increase from the first quarter, 1961, rate of $19.1 billion. Even so, this gain would leave us approximately $1 billion short of the $23.5 billion (annual rate) all-time high achieved during the second quarter of 1959."

The consumer, as usual, will play an important role in the comeback. Spending for durables, which has been badly depressed, will rise sharply this quarter from the first quarter's low of $39.5 billion and reach a fourth quarter high of $46 billion annual rate, the bureau thinks. Spending for soft goods and services will "increase somewhat proportionately with the growth in the economy and by the fourth quarter of this year is expected to approximate $304 billion."

But one of the biggest shifts in the GNP will be in the inventory sector. From a decumulation rate of over $4 billion annually in the fourth quarter, the inventory account will rise to an accumulation rate of over $4 billion. The net change of almost $9 billion annual rate will occur mostly in consumer and producer durable goods.

Chase Manhattan Bank, New York, opines that the recovery will be "normal," with the FRB index gaining about 15 per cent in the





	Domestic Awards		Backlogs (end of month)	
	1961	1960	1961	1960
Jan.	1,339	5,742	18,894	48,170
Feb.	1,536	3,211	18,429	45,323
Mar.	1,796	1,957	15,801	42,131
Apr.	2,040	5,352	13,658	41,003
May	....	2,285	.....	36,106
June	....	316	.....	29,555
July	....	1,331	.....	26,658
Aug.	....	1,333	.....	23,866
Sept.	....	2,206	.....	21,662
Oct.	....	5,864	.....	22,900
Nov.	....	3,740	.....	22,781
Dec.	....	2,705	.....	21,070
Total	....	36,368		

*Domestic only.
American Railway Car Institute.

	Net Orders		Shipments	
	1961	1960	1961	1960
Jan.	2,013	3,258	1,731	1,582
Feb.	2,236	3,732	1,916	2,563
Mar.	1,871	2,653	2,739	3,011
Apr.	1,322	2,446	2,613	2,943
May	.....	1,871	....	2,310
June	.....	2,205	....	3,267
July	.....	3,244	....	2,221
Aug.	.....	1,330	....	2,528
Sept.	.....	1,689	....	2,559
Oct.	.....	2,145	....	2,328
Nov.	.....	2,457	....	1,927
Dec.	.....	2,525	....	1,974
Totals	....	28,933	....	29,218

Resistance Welder Manufacturers' Assn.

next year. But the bank declares: "The problem is to make sure the advance carries beyond the next year and on to full prosperity."

The Indiana University report comments: "The rise in GNP will continue, but less dramatically than during 1961—and will approach a $550 billion seasonally adjusted annual rate in the second quarter (of 1962). Record levels of activity will be established in virtually all sectors of the economy . . . interest rates will be up . . . no substantial reduction is seen in unemployment below the level of late 1961 . . . the optimists will be contemplating a business capital spending boom—the pessimists the next downturn."

Hard Goods Outlook Uncertain

The tables and graphs on Pages 58-59 tend to validate the contention that capital spending still has a long way to go before the recession can be considered 100 per cent over. Further evidence: The Machinery Dealers National Association says sales of used machine tools in April came to only 99.8 per cent of the 1957 average compared with 99.0 per cent in March. The National Industrial Distributors' Association reports sales in April were 6.3 per cent below those in March.

On the other hand, the Material Handling Institute Inc. noted that March sales jumped 19.7 per cent ahead of February's. And the American Supply & Machinery Manufacturers' Association Inc. noted a 3.3 per cent improvement in its members' orders in April.

Survey Shows Spending Lag

The spring survey of capital spending plans made by the Federal Reserve Bank of Philadelphia indicated that producers of durable goods in metropolitan Philadelphia hadn't caught the fever of recovery but that producers of nondurables had. Consequently, plans for all manufacturing for 1961 expenditures have dropped fractionally since last October. But in the Trenton, Wilmington, and Lehigh Valley areas, plans showed gains.

However, production forecasts by the Philadelphia manufacturers show a decided optimism regarding the second and third quarters. The bank says that the capital spending forecasts indicate conditions at the time of the survey, but it feels that when production forecasts are realized, plans will be upgraded.

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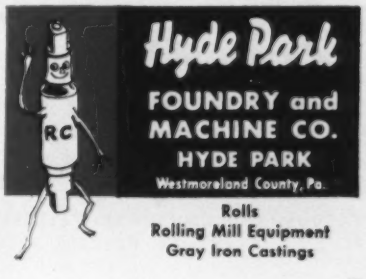

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These vacuum melted finishing rolls are made to last longer and produce products unsurpassed in fine finishes. These rolls have cut repolishing time in half . . . lasted 33% to 50% longer on mill between grinds.

For a higher standard of quality and lower maintenance costs specify Midvac Rolls for your mill. Midvale-Heppenstall also makes forged steel rolls of any size, for any purpose required in the rolling of steel, aluminum, copper, bronze and other metals . . . as well as paper, plastics and rubber. Write for complete details to . . .

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RINGS • PRESSURE VESSELS • INDUSTRIAL KNIVES • DIE BLOCKS • MATERIALS HANDLING EQUIPMENT

JACK R. KRUIZENGA
Great Lakes Screw v. p.

W. T. ADAMS
Republic purchasing v. p.

E. M. MEYER
Bliss & Laughlin plant mgr.

JOHN H. GREGORY
heads Buffalo Forge firms

Jack R. Kruizenga was elected vice president-sales, **Great Lakes Screw Corp.**, Chicago. He joined the company last year as assistant to the president. He was assistant general sales manager for Trailmobile Inc.

Charles E. Lamar was appointed executive vice president, **Southern Pipe Div.**, Azusa, Calif., U. S. Industries Inc. He was vice president-marketing.

Ingalls Iron Works Co., Birmingham, appointed **D. H. Bradley** director of manufacturing; **Ross S. Anderson** director of marketing; **C. T. Capp** general manager, sales-custom products; **H. G. Miller** general manager, sales-standard products.

Edward R. Horejs was named general manager of **F. C. Russell Co.'s** Rusco Div., with plant at Pandora, Ohio. He succeeds **Robert D. Putman,** resigned.

John K. Foster was elected executive vice president of **Shenango Furnace Co.**, Pittsburgh. He was senior vice president.

Alan Kotliar fills the new post of assistant to the president at **Basic Products Corp.**, Milwaukee.

George A. Stinson was elected vice president and secretary, **National Steel Corp.**, Pittsburgh.

Berger Steel Co. Inc., Lafayette, Ind., elected **Thomas J. Lang** vice president - production; **C. Robert Millikan** vice president-sales.

W. T. Adams was elected vice president-purchasing; **William J. DeLancey** vice president-general counsel at **Republic Steel Corp.**, Cleveland. **Harold C. Lumb,** vice president-legal and public affairs, was named vice president, director of law and corporate relations.

E. M. Meyer was made manager of **Bliss & Laughlin Inc.'s** Mansfield, Mass., plant. He was Western sales manager at general offices in Harvey, Ill.

Fred R. Geiser was elected president of **Cincinnati Steel Castings Co.**, Cincinnati. He succeeds the late **Leonard Geiser.**

Warren C. Hume was promoted to president, Data Processing Div., **International Business Machines Corp.**, New York. He succeeds **Gilbert E. Jones,** appointed assistant to the president of IBM.

F. S. Wittenauer was named assistant general sales manager, **Republic Rubber Div.**, Youngstown, Lee Rubber & Tire Corp. He is succeeded as chief accountant by **R. P. Cannatti.**

Earl P. Leeds was made superintendent of the milling and grinding machine group, Machine Tool Div., **Brown & Sharpe Mfg. Co.**, Providence, R. I. He will continue to direct federal government sales. **James F. Rowley** was made sales director-turret drilling machines; **Arnold N. Hellewell** sales director-screw machine sales. **W. Howard Classen** will be in charge of turret drilling application engineering.

John H. Gregory was elected president of **Canadian Blower & Forge Co. Ltd.**, and of **Canada Pumps Ltd.**, both of Kitchener, Ont., subsidiaries of Buffalo Forge Co. He succeeds **Henry W. Wendt,** now chairman of each company.

Jessop Steel Co. elected two presidents of subsidiary companies. **S. J. Clokey** was named president of Jessop Steel of Canada Ltd., Wallaceburg, Ont. **T. W. Gabriel** was named president of Jessop Steel International Corp., with headquarters in East Orange, N. J. They succeed **C. E. Rice,** executive vice president of Jessop, and president of both subsidiaries. He recently was elected president of Green River Steel Corp., Jessop subsidiary.

Robert J. Brown was appointed head of **General Electric Co.'s** ground and shipboard military electronics business, Syracuse, N. Y. He is general manager, Heavy Military Electronics Dept. and replaces **John J. Farrell,** named as a consultant to **Dr. G. L. Haller,** GE vice president and general manager, Defense Electronics Div.

Eugene Bordinat Jr. was elected a vice president of **Ford Motor Co.**, Dearborn, Mich. He becomes director of styling June 1 to succeed **George W. Walker,** retiring.

A. J. Mei and **C. E. Anthony** were named to new posts at **Westinghouse Electric Corp.'s** Atomic Equipment Dept. at Cheswick, Pa. Mr. Mei was named programs co-ordinator. Mr. Anthony was named man-

WILLIAM J. GREENE

GILBERT R. ROTHSCHILD

Airco research appointments

W. L. PRINGLE

BERT F. WHITBREAD

Motec Industries appointments

ager of the Order Service Dept. to succeed Mr. Mei.

Air Reduction Co. Inc. appointed **William J. Greene** associate director-physical research; **Gilbert R. Rothschild** assistant director-metallurgical development. They head new divisions of the Central Research Laboratories in Murray Hill, N. J.

Harry C. May fills the new post of director of marketing for **Sparton Southwest Inc.**, Albuquerque, N. Mex., subsidiary of Sparton Corp., which will have an electronics facility in operation Aug. 1. Mr. May was general sales manager of California Technical Industries, division of Textron at Belmont, Calif.

Phillip G. Robinson was named sales administrator for corporate sales of **Electric Autolite Co.**, Toledo, Ohio.

Arrow Tool Co., Wethersfield, Conn., appointed **Armand Des Roberts** shop superintendent.

Forest R. Johnson was made regional sales manager (Ohio Valley) for **Instrument Development Laboratories Inc.** He is in Cleveland.

Howard Van Meter was named superintendent of blast furnaces at **Youngstown Sheet & Tube Co.'s** Brier Hill plant, Youngstown. He succeeds **Furman T. Blackwell**, retired.

Thomas B. Simon was named manager of room air conditioning engineering, Major Appliance Div., **Westinghouse Electric Corp.**, at Columbus, Ohio. He succeeds **W. S. Reid.**

W. L. Pringle and **Bert F. Whitbread** were appointed vice presidents of **Motec Industries Inc.**, Hopkins, Minn. Mr. Pringle will direct sales and marketing of Minneapolis-Moline Farm Equipment Div., and Mocraft Power Tool Div. Mr. Whitbread is vice president for Mobilift Materials Handling Equipment Div., Mopower Construction Equipment Div., and Moline Automotive Div.

Roland G. Becker was named assistant sales manager, **Bay State Abrasive Products Co.**, Westboro, Mass. He was manager of sales engineering.

W. R. Dixon was named director of sales; **G. J. Williams** general sales manager; **Oliver E. Beutel** director of distribution and traffic for **Dow Chemical Co.**, Midland, Mich.

Walter T. McCoy Jr. was appointed manager of **R. C. Mahon Co.'s** regional sales-engineering office in Chicago.

M. T. Johnson was named operations manager of **Westinghouse Electric Corp.'s** Testing Reactor at Waltz Mill, Pa.

William J. Reed heads the new West Coast district office of **Riverside-Alloy Metal Div.**, H. K. Porter Company Inc., with offices in Los Angeles. He was alloy product sales manager in the division general office, Riverside, N. J.

Donald C. Heidenburg was made assistant superintendent of **Bethlehem Steel Co.'s** new, 45 by 90 in., slabbing mill at the Lackawanna, N. Y., plant. **A. C. Plehiers** was made superintendent of the new, reinforcing bar, fabricating shop in South San Francisco, Calif.

Kenneth R. Geist was made general manager of the new Special Products Dept. of **Allis-Chalmers Mfg. Co.**, Milwaukee. He is succeeded as director of purchases for the company by **Fred J. MacDougall.**

Edward E. Coolman was appointed director of labor relations for **Udylite Corp.**, Detroit.

M. P. Weigel was appointed a vice president of **Aluminium Ltd.**, Montreal, Que. He has been director of operations since 1957.

A. Miles Oppenheim was made sales manager of the new pressure sensitive tapes and adhesive branch of **Alisco Co.**, Garden City, N. Y.

George R. Ross Jr. was made assistant manager, Procurement Dept., Metal Products Div., Baltimore, **Koppers Co. Inc.** He succeeds **Joseph M. Kalista**, retired.

Harold E. Hamm was made sales manager of **Meridian Metalcraft Inc.**, Whittier, Calif.

Donald E. Becker was made manager of the new San Leandro, Calif., Specialty Metals Div. of **Republic Supply Co. of California.**

Robert P. Laughna resigned as vice president-marketing at Chrysler Corp., to become president and chief executive officer of **Commercial Carriers Inc.**, and **Commercial Barge Lines Inc.**, Romulus, Mich.

James C. Petri was made division manager of **Solar Steel Corp.'s** Union, N. J., plant. He is in

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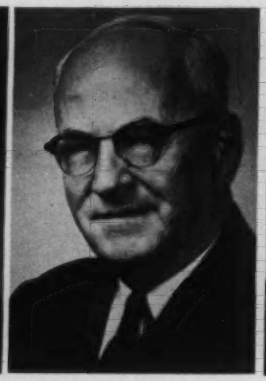
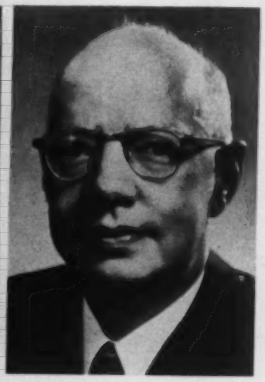
T. ROBERT VAUCHER
Egan's div. manager



JOHN H. CASSIDY
Curtiss-Wright foundry post



H. STUART HARRISON
Cleveland-Cliffs chief exec.

SHERMAN W. MOORE
Mueller Brass sales post

DONALD JONES
Ingersoll Products marketing

VERNON MARSH
American Pulley v. p.

G. W. LATESTE
Stanley Works mfg. post

HAROLD TULLOCH
Vlchek v. p.-mfg.

EDGAR S. McINTIRE
Jessop Warehousing post

charge of operations, sales, and manufacturing.

G. W. Lateste was appointed director of manufacturing equipment for **Stanley Works**, New Britain, Conn. He is in charge of research and advanced development, design and construction of automatic machinery and automated production lines.

Harold Tulloch was elected vice president - manufacturing, **Vlchek Tool Co.**, Cleveland. Factory manager for the last year, he previously was operations manager for Utica Drop Forge Corp.

Edgar S. McIntire was named works manager, Steel Warehousing Div., Broadview, Ill., **Jessop Steel Co.** He was assistant works manager.

T. Robert Vaucher was made manager of the new Metal Processing Div. of **Frank W. Egan & Co.**, Somerville, N. J. Former sales manager, Niagara Machine & Tool Works, he will be in charge of engineering, production, and sales of coil handling and feeding machines manufactured by Egan.

John H. Cassidy was appointed foundry sales manager, Metals Processing Div., Buffalo, **Curtiss-Wright Corp.** He was service engineer-stainless steel castings at Allegheny Ludlum Steel Corp.

H. Stuart Harrison, president since May, 1960, of **Cleveland-Cliffs Iron Co.**, Cleveland, becomes president and chief executive officer. **Walter A. Sterling** retires as chairman and chief executive officer. **John S. Wilbur**, vice president-ore sales and marine, was elected senior vice president.

Sherman W. Moore was made manager of sintered metal products sales, **Mueller Brass Co.**, Port Huron, Mich. He was regional sales manager, Amplex Powder Metal Div., Chrysler Corp. **H. Lee Brandenburg** was made manager, Defense Products Div. He was manager, Special Products Div., Gibson Refrigerator Co.

Donald Jones was appointed product marketing manager for Emcor products at **Ingersoll Products Div.**, Chicago, Borg-Warner Corp. **J. Michael Votava** was named field sales manager for Emcor, and **H. N. Bowen** sales supervisor.

Vernon Marsh was elected vice president, **American Pulley Co.**, Philadelphia, division of Van Norman Industries Inc. He was factory manager.

Richard J. Hearty, executive vice president, was elected president of **Imperial Electric Co.**, Akron.

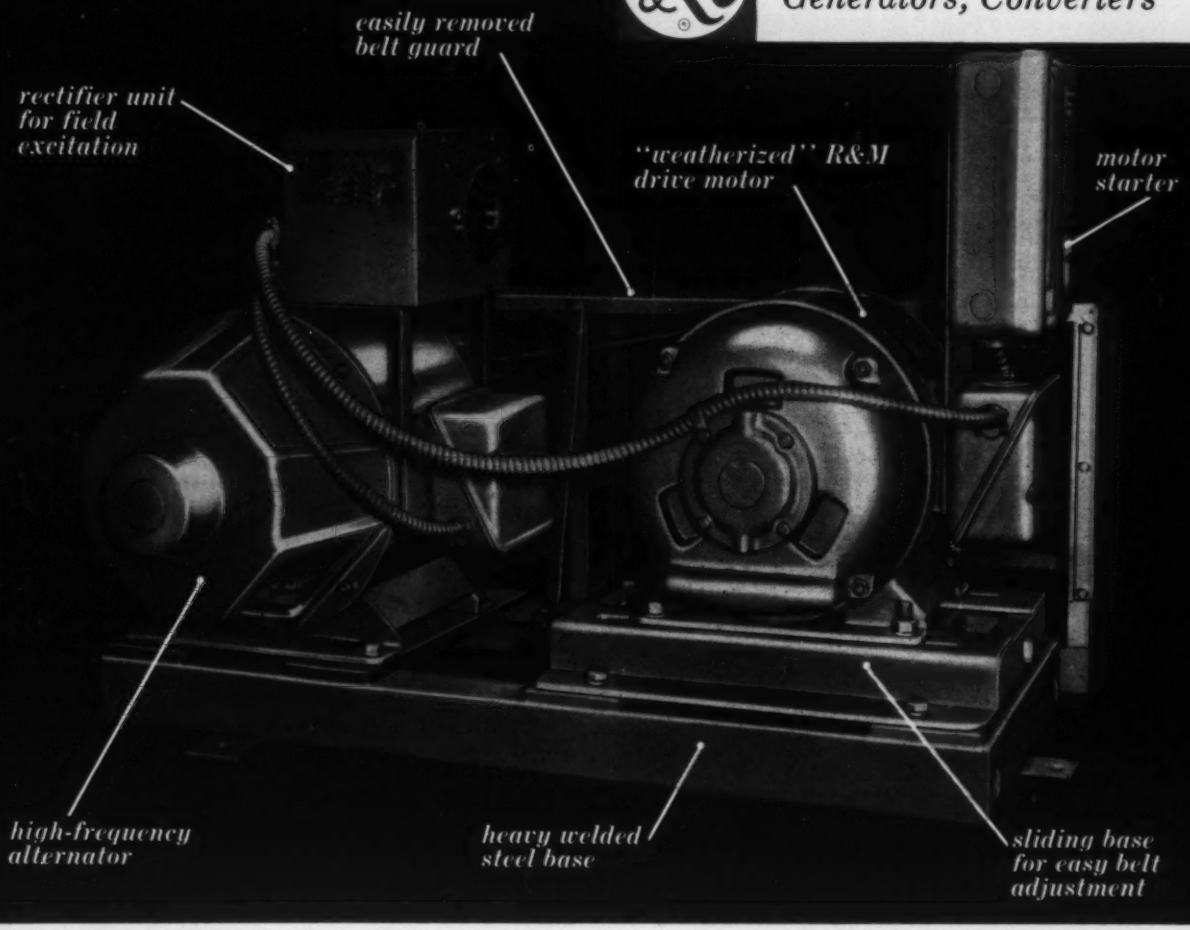
OBITUARIES...

Ray F. Sparrow, 63, executive vice president, **P. R. Mallory & Co. Inc.**, Indianapolis, died May 22.

John Tedford Bachman, 61, vice president-strip sales, **Jones & Laughlin Steel Corp.'s** Stainless & Strip Div., died May 27 in Youngstown.

high frequency

Generators, Converters



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360 to 3300 cycles

R&M package high cycle generators provide dependable current beyond the practical range of frequency converters. Rugged revolving field construction is used in ratings of 1500 cycles and lower. Ratings above 1500 cycles are brushless inductor design. Excitation of DC alternator field is provided by simple silicon rectifiers, protected against short circuits by time-delay fuses. For changing output frequency, R&M can furnish variable pitch pulleys or variable speed drives. R&M's low-cost frequency converters make 220 volt-3 phase-120 through 420 cycle power available from 60 cycle supply . . . rated 2½ KW (horizontal construction) 5, 7½ and 10KW (vertical).

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Subsidiary companies at: Memphis, Tenn., Pico Rivera, Calif., Brantford, Ontario.

How's this for high-speed hobbing?

WORK PIECE					HOB (1 start)				Pieces per Load	Method*	Time per Piece	Pieces per Grind	Cut
Dia. Pitch	No. of Teeth	Helix Angle	Face Width	Material	Dia.	RPM	Feet PM	Feed					
10	20	15°	1¾"	1040 leaded	3"	500	395	.055"	1	A	2 min. 25 sec.	150	Finish
7	23	13°	¾"	8620	4"	350	370	.100"	2	A and B	59 sec.	240	Pre-shave
5	43	24°	1⅝"	8620	4"	280	300	.100"	2	B	3 min. 45 sec.	80	Pre-shave

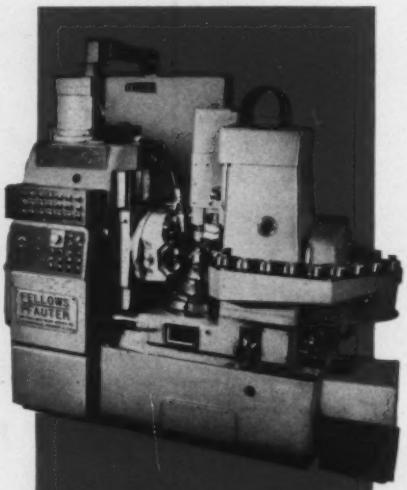
* *Method A: Diagonal Hobbing. Method B: Step-by-step Hobbing.*

The chart shows the cost-cutting, high-production performance you get with the Fellows-Pfauter P 400 High-Speed Hobbing Machine. And here are some advanced design features that make it possible:

It's Easy & Fast to Handle. Work area is easily accessible for setup and loading • Automatic retraction of table from hob facilitates work changes • Pushbutton hob shifting • Built-in hydraulics for operation of tailstock and fixtures • Provides infinitely variable speeds and feeds.

It's Rigid and Rugged for High Production. Heavy, rugged hob head • Double wall construction column and bed, with heavy V-ways • Table as large as maximum work piece diameter • Index worm gear nearly as large as work table • Work support column of massive construction.

Saves time, floor space and production costs. Get complete details on the Fellows-Pfauter P 400 High-Speed Hobbing Machine.



The Fellows-Pfauter P 400 High-Speed Hobbing Machine can be equipped with automatic loading and unloading devices to further increase its productivity.

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Fellows

Gear Production Equipment

Linde Lifts Oxygen Supply For Use in Steelmaking

STEELMAKERS continue to press for faster, higher capacity oxygen techniques in their operations. The basic oxygen conversion process turns out a finished heat of steel in 20 to 30 minutes compared with 4 to 8 hours for a standard open hearth furnace heat.

Linde Co., a division of Union Carbide Corp., New York, has placed in operation a unit at Pueblo, Colo., that produces 280 tons of metallurgical oxygen daily. A major portion of the plant's output will be used in the basic oxygen steelmaking facilities of Colorado Fuel & Iron Corp., which is completing a $21 million expansion program.

CF&I and Linde have done extensive work on blast furnace applications for oxygen. Tests using natural gas in the blast have been conducted at Pueblo for nearly a year, and a commercial-scale test of blast furnace oxygen and natural gas is planned for the near future.

In addition to improving the over-all cost of efficiency of blast furnace operation, oxygen-natural gas enrichment of the blast will increase CF&I's hot metal capacity, officials say. That is an important consideration in the operation of the basic oxygen steelmaking process because the new furnaces at Pueblo will require a higher ratio of hot metal to cold scrap than is employed in open hearth furnaces.

Linde is working on a number of other on-site oxygen installations to serve the steel industry—they are scheduled to be completed before yearend. In all, present Linde projects will boost on-site, daily capacity of steel industry oxygen by nearly 3000 tons over the total at the end of 1960.

Wyman-Gordon Expands

Wyman-Gordon Co., Worcester, Mass., has completed a $3 million expansion of facilities for production of beryllium (powder, forgings, machined parts). Transfer of precision forging equipment from Franklin Park, Ill., to its Grafton, Mass., plant will permit forging of small, as well as large, beryllium components. Space for processing beryllium at Grafton has been increased from 4000 to 16,000 sq ft.

Research Center Planned

National Lead Co., New York, is constructing a multimillion dollar research center in East Windsor Township (Hightstown), N. J. The first unit will contain 87,000 sq ft of laboratory, office, and service space. The present staff of 150 scientists and technicians at the company's Brooklyn Research Laboratories will be transferred to the new center.

Cold Finisher Expands

Precision Drawn Steel Co., Pennsauken, N. J., has completed an expansion program which raised annual capacity to more than 70,000 tons of cold finished carbon and alloy steel bars and wire products. More than 62,000 sq ft of floor space was added to the mill and additional heat treating furnaces and other equipment have been installed.

Bristol Co. Builds

Bristol Co., Waterbury, Conn., has constructed a building to accommodate the manufacture of a new line of socket screws with the Nylok self-locking element. The building is located at the main plant in Waterbury.

Altech Div. Organized

Financial Development & Research Corp., Parkersburg, W. Va., has established an Altech Div. to make aluminum office and institutional furniture and other metal products. Manufacturing operations will be carried on in the former Ravens-Metal Products Inc. plant at Elizabeth, W. Va. The furniture

(*Please turn to Page* 70)

Here's the Curtain-Raiser to a Quick Solution!

HKP
PORTER CUTTERS

There's a HAND or HYDRAULIC powered PORTER CUTTER to answer your toughest metal-cutting problems — over 100 different cutters, all designed to save you time, labor, and money! Make short work of cutting:

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CUT LABOR COSTS UP TO 97%

The famous PORTER CENTER-CUT CUTTER . . . our most popular tool . . . is the leading all-around cutter for industrial use! For Free Cutting of Soft and Medium Hard Metals up to ¾". Available in 6 sizes.

. . . and for "PRODUCTION" CUTTING

The PORTER WORK-STATION CUTTER can increase one man's output up to 300% in continuous volume cutting! In 3 sizes — up to ½" capacity!

ALSO . . . for those RUGGED JOBS!

The PORTER HEAVY DUTY CUTTER cuts almost anything in metal up to ¾" diameter — thanks to its heat-treated, hard-tempered center-cut jaws! Comes in 3 sizes.

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CUT up to ¾" rods with HAND OPERATED TOOLS — up to 1⅜" rods and 2½" cable with POWER OPERATED TOOLS.

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LOCATION	STEEL SERVICE CENTER
ALABAMA	
Birmingham	O'Neal Steel, Inc.*†
ARIZONA	
Phoenix	Earle M. Jorgensen Co.*†•
CALIFORNIA	
Los Angeles	Allen-Fry Steel Company*
	Baker Steel & Tube Co. •
	Coulter Steel & Forge Co.*†
	Earle M. Jorgensen Co.*†
	Kilsby Tube Supply, Division of Republic Supply Co. of Calif.•
	Joseph T. Ryerson & Son, Inc.*•
	Service Steel Division Van Pelt Corp.•
	Tubesales•
Oakland	Coulter Steel & Forge Company (Emeryville)*†
	Earle M. Jorgensen Co.*†
	Joseph T. Ryerson & Son, Inc.*•
San Francisco	Baker Steel & Tube Co.•
	Earle M. Jorgensen Co.*†
	A. Milne & Co., Inc. (Burlingame)†
COLORADO	
Denver	Earle M. Jorgensen Co.*†•
CONNECTICUT	
Windsor	SAE Steels, Inc.*
GEORGIA	
Atlanta	A. Milne & Co., Inc.†
	O'Neal Steel, Inc.*†
HAWAII	
Honolulu	Earle M. Jorgensen Co.*†•
ILLINOIS	
Chicago	Chicago Tube and Iron Co.•
	Hy-Alloy Steels Co.*•
	A. Milne & Co., Inc. (Melrose Park)†
	The Peninsular Steel Co.†
	Joseph T. Ryerson & Son, Inc.*•
	Service Steel Division Van Pelt Corp.•
INDIANA	
Indianapolis	The Peninsular Steel Co.†
KANSAS	
Wichita	Earle M. Jorgensen Co.*†•
LOUISIANA	
New Orleans	Earle M. Jorgensen Co.*†•
MASSACHUSETTS	
Boston	A. Milne & Co., Inc.†
	Joseph T. Ryerson & Son, Inc. (Allston)*•
MICHIGAN	
Detroit	Alloy Steels, Incorporated†
	A. Milne & Co., Inc.†
	The Peninsular Steel Co.†
	Joseph T. Ryerson & Son, Inc. •
	Service Steel Division Van Pelt Corp.•
	Tubular Sales•
Grand Rapids	The Peninsular Steel Co.†
MINNESOTA	
St. Paul	Paper, Calmenson & Company*
MISSISSIPPI	
Jackson	O'Neal Steel, Inc.*†
MISSOURI	
St. Louis	Ford Steel Company†
	Joseph T. Ryerson & Son, Inc.*•
NEW JERSEY	
Elizabeth	A. B. Murray Co., Inc.•
Englewood	Tubesales•
Jersey City	Joseph T. Ryerson & Son, Inc.*•
Kenilworth	A. Milne & Co., Inc.†
Linden	Bowsteel Distributors Corporation*
Newark	Faitoute Iron & Steel Company, Inc.*
NEW YORK	
Buffalo	The Peninsular Steel Co. (Tonawanda)†
	Joseph T. Ryerson & Son, Inc.*•
	Service Steel Division Van Pelt Corp.•
Garden City (L.I.)	Tube Distributors Co., Inc.•
New York	A. Milne & Co., Inc.†
NORTH CAROLINA	
Charlotte	Joseph T. Ryerson & Son, Inc. •
OHIO	
Akron	The Peninsular Steel Co.†
Cincinnati	Ford Steel Company†
	Joseph T. Ryerson & Son, Inc. •
	SAE Steels, Inc.*
	Service Steel Division Van Pelt Corp.•
Cleveland	A. Milne & Co., Inc. †
	The Peninsular Steel Co. (Bedford Heights)†
	Joseph T. Ryerson & Son, Inc.*•
	SAE Steels, Inc.*
Dayton	Alloy Steels, Incorporated†
	A. Milne & Co., Inc.†
	The Peninsular Steel Co.†
Toledo	The Peninsular Steel Co.†
OKLAHOMA	
Tulsa	Earle M. Jorgenson Co.*†•
OREGON	
Portland	Pacific Machinery and Tool Steel Co.†
PENNSYLVANIA	
Bristol	A. B. Murray Co., Inc.•
Butler	Keystone Pipe & Supply Co.•
Carnegie	A. Milne & Co., Inc.†
	Joseph T. Ryerson & Son, Inc.*•
McKeesport	A. B. Murray Co., Inc.•
Philadelphia	Capitol Pipe & Steel Products, Inc.•
	A. Milne & Co., Inc.†
	Joseph T. Ryerson & Son, Inc.*•
TENNESSEE	
Chattanooga	O'Neal Steel, Inc.*†
TEXAS	
Dallas	Earle M. Jorgensen Co.*†•
	Joseph T. Ryerson & Son, Inc.*•
Houston	Earle M. Jorgensen Co.*†•
	Peden Iron & Steel Co.•
	Joseph T. Ryerson & Son, Inc.*•
UTAH	
Salt Lake City	Coulter Steel & Forge Company*†
WASHINGTON	
Seattle	Coulter Steel & Forge Company*†
	Earle M. Jorgensen Co.*†
	Joseph T. Ryerson & Son, Inc.*•
Spokane	Joseph T. Ryerson & Son, Inc.*•
WISCONSIN	
Milwaukee	Joseph T. Ryerson & Son, Inc.*•
CANADA	
London, Ontario	Vanadium-Alloys Steel Canada, Limited†
Montreal, Quebec	Drummond, McCall & Co., Limited•
	Vanadium-Alloys Steel Canada, Limited†
Toronto, Ontario	Drummond, McCall & Co., Limited•
	Vanadium-Alloys Steel Canada, Limited†

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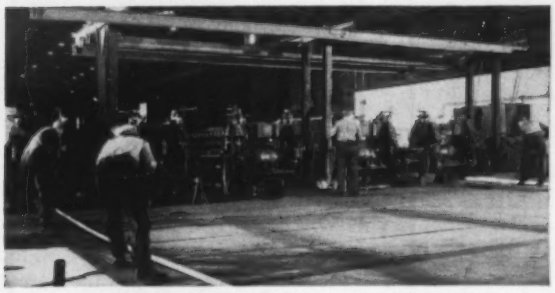
Your Steel Service Center supplies Timken® seamless steel tubing in carbon, alloy and stainless grades. And the Timken Company's 100% final inspection—of dimension, surface and internal quality—assures you it's the finest tubing available. Your Steel Service Center helps you save in other ways, too. It frees your inventory capital . . . releases your inventory space for more productive use. And you're assured of fast delivery of steel ready for use, cutting your processing cost, helping you maintain production schedules.



Timken graphitic tool steels are the most stable tool steels you can buy. Developed by Timken Company metallurgists, their structure contains a combination of free graphite particles and diamond hard carbides that gives you easier machinability and longer wear than ordinary tool steels. They are available only from your Steel Service Center.

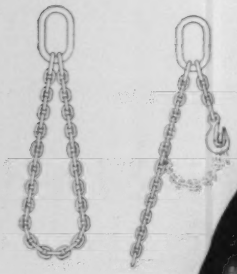
You can get Timken alloy steel bars in a wide range of sizes and analyses. And when you use Timken steel, technical help is available from the Timken Company's own steel experts. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

TIMKEN® *Fine Alloy* STEEL

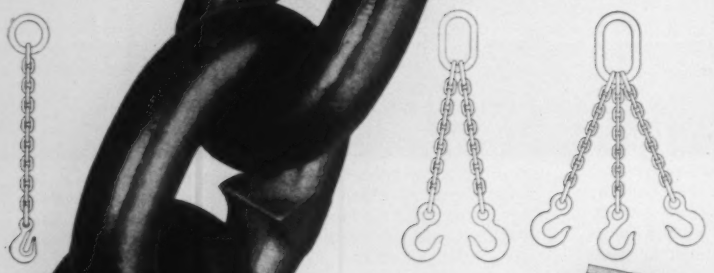
HERC-ALLOY

THE ORIGINAL ALLOY STEEL CHAIN

Herc-Alloy has many superior features ...has high tensile strength...is lighter, therefore easier to handle... is long wearing...offers high resistance to impact loading...is INSWELL welded.



Herc-Alloy is sold in running lengths and in all types and sizes of sling chains assembled to customers' specifications. CM also produces a complete line of chain attachments and welded chain of all types including stainless steel.



● Write for Data Book covering Herc-Alloy Sling Chains, including helpful information on their assembly, care, use and inspection.

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COUPLING LINKS

● Assemble or rebuild your own Herc-Alloy sling chains with all components furnished by your local distributor. Hammerlok is simple, safe, reusable. New Herc-Alloy assemblies can now be ordered with welded or Hammerlok Coupling Links as desired.

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CM®
CHAIN

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CHAIN DIVISION
COLUMBUS McKINNON CORPORATION
Tonawanda, New York
NEW YORK (Mountainside, N. J.)
CHICAGO • CLEVELAND • SAN FRANCISCO
In Canada: **COLUMBUS McKINNON LIMITED, ST. CATHARINES, ONT.**

HERC-ALLOY®

(Concluded from Page 67)

line developed by Ravens will be produced there. Ravens-Metal will devote all of its effort to production of aluminum transportation equipment.

Stamping Plant Enlarged

Ford Motor Co., Dearborn, Mich., is expanding and modernizing its stamping plant in Woodlawn (Buffalo), N. Y. The program includes the installation of 29 additional stamping and welding presses and building of a recently completed 12,000 sq ft plant extension. When the program is completed, the plant will have 404 stamping and welding presses, including 113 major stamping presses.

Westinghouse Expands

Westinghouse Electric Corp., Pittsburgh, has expanded its production facilities for electroluminescent panels (STEEL, Apr. 17, p. 109). New facilities will permit the company to produce the light panels in metal, as well as in glass and plastic.

Equipment Firm Sold

Safety Electrical Equipment Corp., New Haven, Conn., has been acquired by Ajax Magnethermic Corp. and a group headed by Robert Dodds, executive vice president and general manager, and John Kennedy, vice president of the New Haven firm. Safety Electrical Equipment makes special motor generators and controls, air conditioning systems for railroads, magnetic brakes, and other special allied control devices.

Firms Change Designations

Olin Mathieson Chemical Corp., New York, has announced it prefers Olin in general references to the firm. It also changed the name of Western Brass to Olin Brass. The brass operations are part of Olin's Metals Div.

Water Tube Boiler & Tank Co., Chicago, changed its corporate name to Watubo Industries. The company designs, manufactures, and fabricates fluidynamics equipment.

Burg Tool Mfg. Co. Inc., Gardena, Calif., changed its name to

who cares about the core . . . *as long as the rest tastes good? This viewpoint can't be shared by users of stainless or high temperature alloys or tool steels. For production men who know anything about steelmaking . . . recognize that weak structure or poor composition at the core of an ingot can mean trouble with every piece of steel that comes from it. It can result in higher rejection rates, premature part failure, shortened tool and die life, increased production costs, and dissatisfied customers.*

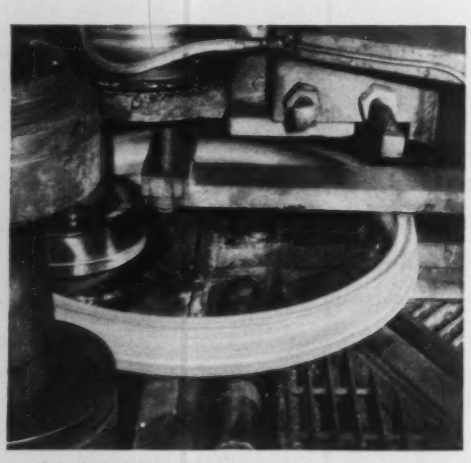
That's why we say the exclusive MEL-TROL® process goes a step beyond quality control. It includes a new, patented ingot mold which controls the freezing process . . . forces impurities to the top where they can be cut off and discarded. This MEL-TROL ingot is more uniform . . . freer from segregation. You get clean, sound, tough metal from core to surface in every lot of steel you order. Use MEL-TROL Specialty Steels and enjoy the luxury of saying: "No problems . . . never a thought about cores!"

Carpenter steel

you can do it ***consistently*** better with Carpenter Specialty Steels for specialists

Steel

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.



Manufacturer uses ring-roller to shape turbine seal rings made of HASTELLOY alloy X

The surging power of modern 20,000-pound thrust jet engines is being harnessed effectively by critical parts made of HAYNES high-temperature alloys. Turbine seal areas are typical of the hot spots in which these alloys serve. Here, in the form of turbine seal rings, they contain the hot combustion gases as they roar through the various turbine stages.

In these, and in other parts too, such as afterburner liners, flame holders, shrouds, and investment-cast turbine blades and nozzle vanes, HAYNES alloys are resisting the punishing effects of long hours at high temperature. In fact, one of the Air Force's latest 1500-MPH jets uses six different HAYNES alloys in vital parts where heat and stress would weaken and fatigue other materials.

Whether investment- or sand-cast, rolled, wrought, vacuum melted, or air melted, there's a HAYNES high-temperature alloy to meet your needs.

HAYNES
ALLOYS

HAYNES STELLITE COMPANY
Division of Union Carbide Corporation
Kokomo, Indiana

Address inquiries to Haynes Stellite Company, 270 Park Avenue, New York 17, N.Y.

UNION CARBIDE

"Haynes," "Hastelloy," and "Union Carbide" are registered trade marks of Union Carbide Corporation.

Burgmaster Corp. Burgmaster was formerly the small tool division of Burg Tool Mfg. It will be known as the Small Tool Div. of the Burgmaster Corp.

NEW PLANTS

SKF Industries Inc., Philadelphia, will erect a 30,000 sq ft plant in Kilmarnock Industrial Park, north of Towson (Baltimore), Md. The $1 million unit will be used for manufacturing research and development of special types of bearing production machinery.

Wellman Bronze & Aluminum Co. has moved its plant facilities from Cleveland to the former Dow Metal Products Co. magnesium and aluminum casting plant in Bay City, Mich. New aluminum melting furnaces have been installed and when expansion is complete the foundry will have 25 aluminum and 6 magnesium permanent molding units.

Parker-Hannifin Corp., Cleveland, has leased a plant in Huntsville, Ala., which it will equip primarily to service its line of fluid system components for space vehicles. The plant will have limited capabilities to produce fluid power components. The facility will be operated as a department of the company's Parker Aircraft Div., Los Angeles. Ned Shiflett is manager of the Huntsville operation.

Whitehead Metals Inc., a subsidiary of International Nickel Co., New York, opened a sales office and warehouse in Meadows Industrial Park, Woodlawn (Baltimore), Md. The facility is under the management of D. G. Pettigrew.

Zol-Mark Industries, a branch of Zol-Mark (Canada) Ltd., Winnipeg, Man., opened an electroplating and metal finishing plant at Regina, Sask.

Parts Div., Warren, Pa., Sylvania Electric Products Inc., opened a new plant in that city. It produces welded components for the electrical-electronics industry. Sylvania is a subsidiary of General Telephone & Electronics Corp., New York. Merle

(*Please turn to Page 76*)

CLEANING *Specialists* FOR AMERICAN INDUSTRY

NEW Miracle Phosphate Coating MICROBOND

MICROBOND, a new product developed in the laboratories of Detrex Chemical Industries, Inc., is a micro-crystalline phosphate coating designed to greatly improve paint adhesion.

One of its many advantages in the pre-paint treatment of steel is its ultra-fine grained crystalline structure. It is a single material that requires no separate replenisher or accelerator and, in addition, has a very low sludge rate.

MICROBOND provides controlled optimum coating weights which allow one coat paint systems to produce a high gloss paint finish. This finish has far superior direct and reverse impact properties over conventional pre-treated finishes. It will operate in regular five or more stage equipment.

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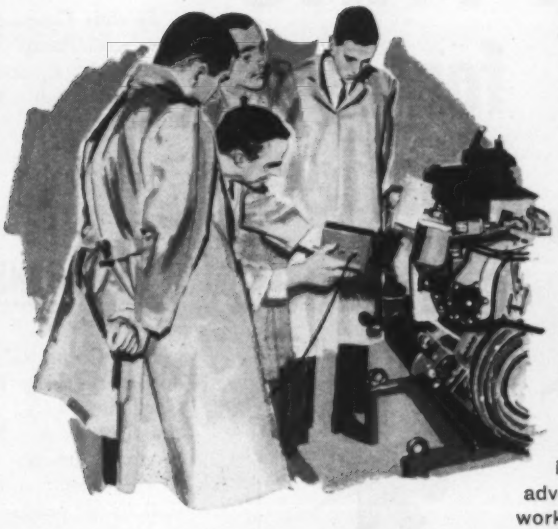
A sales organization especially trained to serve industrial and fleet customers . . . 74 District Offices and 13 Regional Offices . . . 4,100 warehouses and distribution points . . . 12 refineries . . . more than 2,000 products to serve you . . . this is American Oil Company.



The American Oil Company representative who calls on you receives special training in servicing industrial and fleet customers at our Sales Engineering School. His training begins with a concentrated course in petroleum product quality and application. According to a planned schedule, he returns for an advanced course and then again for post-graduate work. From our Marketing Technical Service Department, your American Oil representative draws assistance, when needed, from specialists who are recognized authorities in their fields. These specialists may be called in at any time to work with you on your lubrication problems. More than a thousand research scientists and technicians at our research laboratory support the effort of our representative to serve you. Their mission: To help your American Oil representative help you lower your maintenance costs and stretch your maintenance dollars. Learn more about American Oil, its men, its service, its products.

AMERICAN

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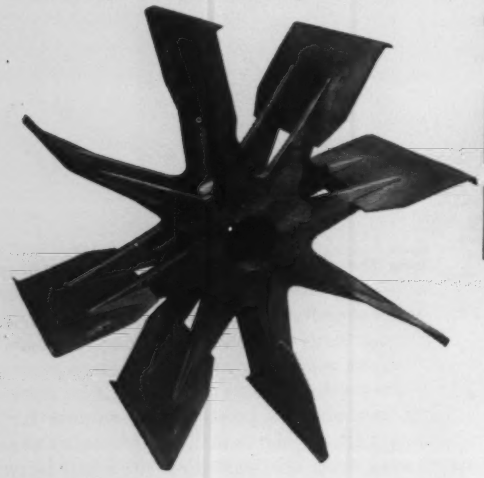
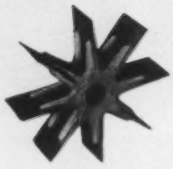
HT ALLOY FANS

(15 Cr—35 Ni)

for Lindberg Furnaces





DURALOY

128 pound Fan, Conventionally Cast with Blades Set in the Mold before Pouring.

DURALOY

21 pound Fan, Shell Molded, Single Casting.

Lindberg Engineering Company uses a considerable number of Duraloy castings such as these in its line of heat-treating furnaces.

These two fans, used for circulating products of combustion, have been alloyed to meet temperatures ranging from 1600 to 1950°F. While these two particular castings were shipped rough cast, we have complete machine shop facilities for finishing castings to any degree desired.

Lindberg also purchases many of our HOM castings good for temperatures up to 2200°F.

Perhaps you would like to know more about the Duraloy experience, equipment and facilities in the field of high alloys. Send for our general catalog and if at the moment you have any casting requirements, we'll be glad to discuss them and quote. Our experience in this highly specialized field goes back 40 years.

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EASTERN OFFICE: 12 East 41st Street, New York 17, N. Y.

CHICAGO OFFICE: 332 South Michigan Avenue

DETROIT OFFICE: 23908 Woodward Avenue, Pleasant Ridge, Mich.

(*Concluded from Page 73*)

W. Kremer is vice president and general manager of the Parts Div.

Flexible Coupling Div., Sier-Bath Gear & Pump Co. Inc., North Bergen, N. J., opened a warehouse at 142 Utah Ave., South San Francisco, Calif.

CONSOLIDATIONS

Pall Corp., Glen Cove, N. Y., acquired **Trinity Equipment Corp.**, Cortland, N. Y., and will operate the firm as a subsidiary. Trinity produces dry air and gas systems, thermowells, and thermocouples. Pall Corp. products include porous metal filters, water treatment equipment, pressure indicators, and switches.

Sivyer Steel Casting Co. acquired the **Riverside** foundry at Bettendorf, Iowa, and will operate it as the Riverside Div. R. H. Swartz has been named vice president of Sivyer Steel and general manager of Riverside. Sivyer Steel operates steel foundries in Milwaukee and Chicago.

Texas Gas Transmission Corp. acquired a controlling interest in **Kentucky Electronics Inc.**, Owensboro, Ky., manufacturer of electronic components.

Eaton Mfg. Co., Cleveland, acquired a majority interest in a newly organized Italian firm, **Eaton Livia S.p.A.**, which has bought the business and most of the assets of Officine Sant - Ambrogio S.p.A., Turin, Italy.

Cal-Tech Systems Inc. purchased **Fullview Corp.**, manufacturer of aluminum sliding doors. Both firms are in Glendale, Calif.

Diamond Power Specialty Corp., Lancaster, Ohio, purchased from Whitfield Industrial Developments Ltd., London, these companies in Southampton, England: **Diamond Blower Co. Ltd.** (seller of boiler cleaning products); **Ferry-Diamond Engineering Co. Ltd.** (maker of boiler cleaning products); and **Fyrex Ltd.** (maker and seller of pumps, filtration plant and fire fighting

what shape are your files in?

Shape is as important as length, kind of teeth or degree of coarseness in selecting the right file for each job. That's why there are literally dozens of different shapes among the more than 6000 files in the Nicholson or Black Diamond line. The most basic cross-sections are shown above.

Now's a good time to check your supply of files – and the shape it's in... a good time to replace worn files and obtain additional file "shapes" so that you'll always have the right Nicholson or Black Diamond file for each requirement.

Your distributor* will be glad to suggest a sound file selection for your particular needs. Call him today.

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For Service Contact...

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Connecticut Mall. Castings Co., New Haven 6
Eastern Malleable Iron Co., Naugatuck

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Iron Works, Moline
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI
Mississippi Malleable Iron Co., Meridian

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

NEW YORK
Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council

equipment). The purchased companies will be combined under the Diamond Blower Co. Ltd. name. H. V. Gort is managing director. The Lancaster firm is a subsidiary of Babcock & Wilcox Co.

Robertshaw-Fulton Controls Co., Richmond, Va., will purchase (subject to stockholders' approval) **Lux Clock Mfg. Co. Inc.**, Waterbury, Conn., manufacturer of electrical, pneumatic, and mechanical timing devices.

Foxboro Co., Foxboro, Mass., plans to acquire the assets of **Waugh Engineering Co.**, Van Nuys, Calif., producer of electromechanical and electronic instruments. The firm would be operated as a division of Foxboro.

ASSOCIATIONS

American Iron & Steel Institute, New York, elected these officers: President, B. F. Fairless; executive vice president, Max D. Howell; vice president and secretary, G. S. Rose; vice president-research and technology, C. M. Parker; assistant secretary, F. A. Coombs. Vice presidents are: W. M. Akin, Laclede Steel Co., St. Louis; Arthur B. Homer, Bethlehem Steel Co., Bethlehem, Pa. Assistant vice presidents are: Leo Teplow, W. G. Kirkland, and R. E. Paret. E. O. Sommer Jr., Keystone Steel & Wire Co., Peoria, Ill., is treasurer.

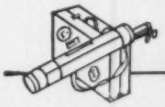
American Material Handling Society Inc. opened headquarters at 2860 E. 130th St., Cleveland 20, Ohio. W. B. McClelland is secretary.

Metal Powder Industries Federation, New York, elected these officers: President, W. A. Irvine, Maytag Co., Newton, Iowa; executive secretary and treasurer, Kempton H. Roll. The trade associations comprising the federation also elected officers. **Powder Metallurgy Parts Manufacturers Association:** President, R. C. Burgess, Burgess-Norton Mfg. Co., Geneva, Ill.; vice president, P. J. Failla, Johnson Bronze Co., New Castle, Pa.; and treasurer, W. L. Strawbridge, Precision Metal Products Co., Ellwood City, Pa. **Metal Powder Producers Association** elected Earl Lowe, Greenback Industries Inc., Birmingham, Mich., president; **In-Plant Powder Metallurgy Association,** P. V. Schneider, International Business Machines Corp., New York; **Powder Metallurgy Equipment Association,** N. K. Koebel, Lindberg Engineering Co., Chicago; and **Metal Powder Core Association,** J. C. Webb, Magnetic Core Corp., Newburgh, N. Y.

The **Packaging Machinery Manufacturers Institute** Show of 1961 to be held in Detroit's Cobo Hall from Nov. 7 through Nov. 10 is "sold out," report show officials. Products of 216 firms will be exhibited.

Michael P. Komar, Inland Steel Products Co., Milwaukee, has been elected president of the **Metal Roof Deck Technical Institute**, Chicago.

National Welding Supply Association, Philadelphia, elected W. P. McLendon, Keenan Welding Supplies Co., Albany, Ga., president.



VACATIONS

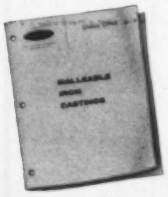
Lamp Div., Bloomfield, N. J., **Westinghouse Electric Corp.**, will halt operation at the close of business July 14 and will resume full operations in all its parts and materials plants Aug. 7.

Haynes Stellite Co., Kokomo, Ind., a division of Union Carbide Corp., will close its wrought alloy plant from July 15 through July 30. A skeleton crew will be on hand to handle orders that can be shipped from stock. Repair and maintenance of equipment will be carried out during the shutdown. It will not affect the sand or investment foundries of the firm.

Nopco Chemical Co., Newark, N. J., and its **Metasap Div.** will follow this vacation schedule: Harrison, N. J., plants will be closed from July 1 through July 17; Cedartown, Ga., plant, from June 10 through June 25; Richmond, Calif., plant, from Aug. 5 through Aug. 19. The firm's subsidiary, Jacques Wolf & Co., Newark, will be closed from July 29 through Aug. 20.

Post-Forming: New Way to Bigger Savings with Malleable Castings

The ductility of Malleable iron castings permits use of high-speed forming techniques to finish Malleable parts at lower cost. Take advantage of the versatility you get only with ferritic and pearlitic Malleable castings. For a fuller understanding of how Malleable can help you, call any producer that displays this symbol —

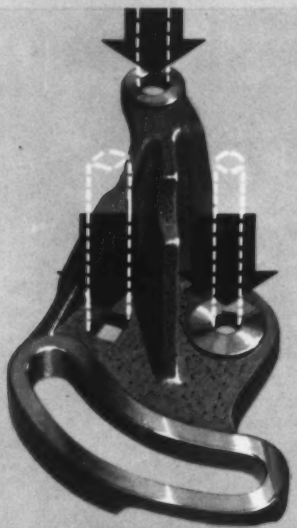


Free Folder describing these techniques is available for your use. Just ask any member of the Malleable Castings Council for Data Unit No. 116, or write to Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.

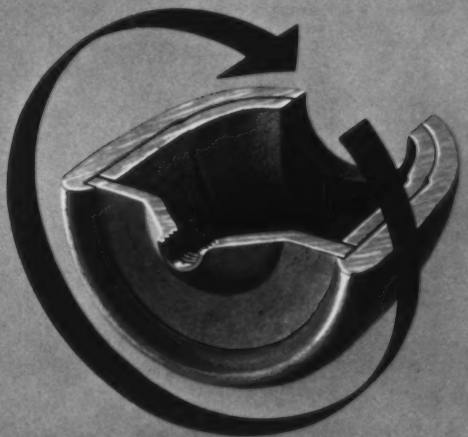
MEMBER
MALLEABLE
CASTINGS COUNCIL

Hot Form It — Hot coining this Malleable transmission part reduces finished cost . . . eliminates three cutting operations required by the previously used steel part.

Roll It — Oil grooves in lawnmower crankshafts and splines in compressor crankshafts are just two of many places where rolling proves more economical than machining.



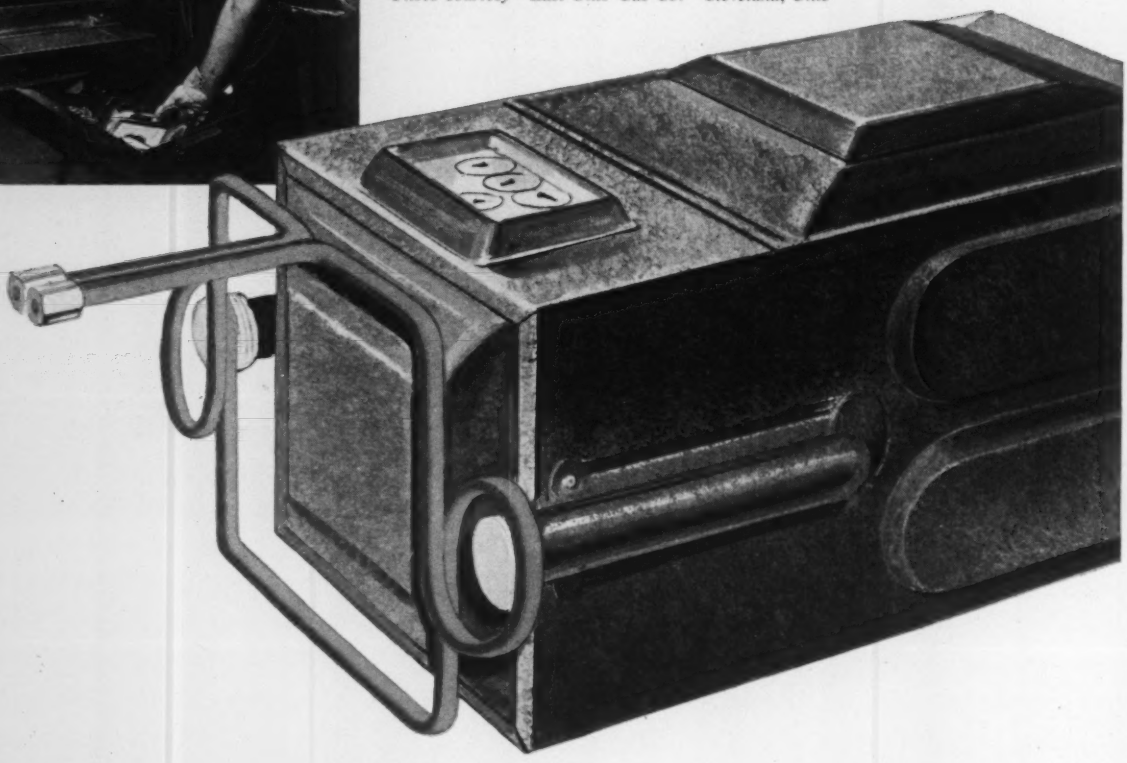
Punch It — Holes with diameters greater than the thickness of the metal can be punched in Malleable. Two round holes and a square hole are punched simultaneously in this idler arm.



Spin It — Malleable's ductility permits the sleeve and end disc in this ball joint to be held in place by spinning the Malleable housing into a strong, permanent flange.

Operator removes top meter panel from tray where it has fallen after being de-soldered.

Photo courtesy—East Ohio Gas Co.—Cleveland, Ohio



Gas Meters De-Soldered 5 Times Faster

with TOCCO Induction Heating*

In just 60 seconds panels are removed for repair of gas meters—a job which formerly required up to 15 minutes with a conventional soldering iron. East Ohio Gas Co.'s 7½ kw 10,000 c.p.s. TOCCO unit has been giving trouble-free operation for 13 years—handling about 75,000 meters per year.

All sizes of meter panels, from 8″ x 12″ to 30″ x 30″, are de-soldered with only four different induction coils. Changing coils takes about three minutes.

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Technical Outlook

PAPERS GO EXOTIC—Any natural fiber or any material that can be processed into fibers can be made into paper, says Mead Corp., Dayton, Ohio. The company says it is developing papers made of glass, asbestos, rayon, acrylics, Teflon, aluminum, zinc, silver, and other noncellulose materials.

CORDLESS DRILL— A new, 4 lb portable drill contains its own power cells which can be reenergized 400 times by a charger, says Black & Decker Mfg. Co., Towson, Md.

NEW TITANIUM ALLOY—High strength requirements of space applications are more nearly satisfied with a new titanium alloy that can attain yield strengths up to 220,000 psi, claims Armour Research Foundation, Illinois Institute of Technology, Chicago. The alloy can be readily welded too.

HIGH STRENGTH TITANIUM— A sintered titanium alloy called CPT-64AV has a tensile strength of 119,000 psi, good ductility (6 per cent elongation), and reaches Rockwell C 23 hardness. With heat treatment, a strength of 146,000 psi can be achieved, claims the Mechanical Research Div., Clevite Corp., Cleveland.

INVISIBLE FURNACE— By substituting transparent plastic for metal and brick in a model, investigators can study furnace design by running air and water through the passages. German sources say good correlation can be obtained between two dimensional and three dimensional situations. The tests show how loading patterns can change soaking pit gas flow, thus changing the heating rates in individual locations.

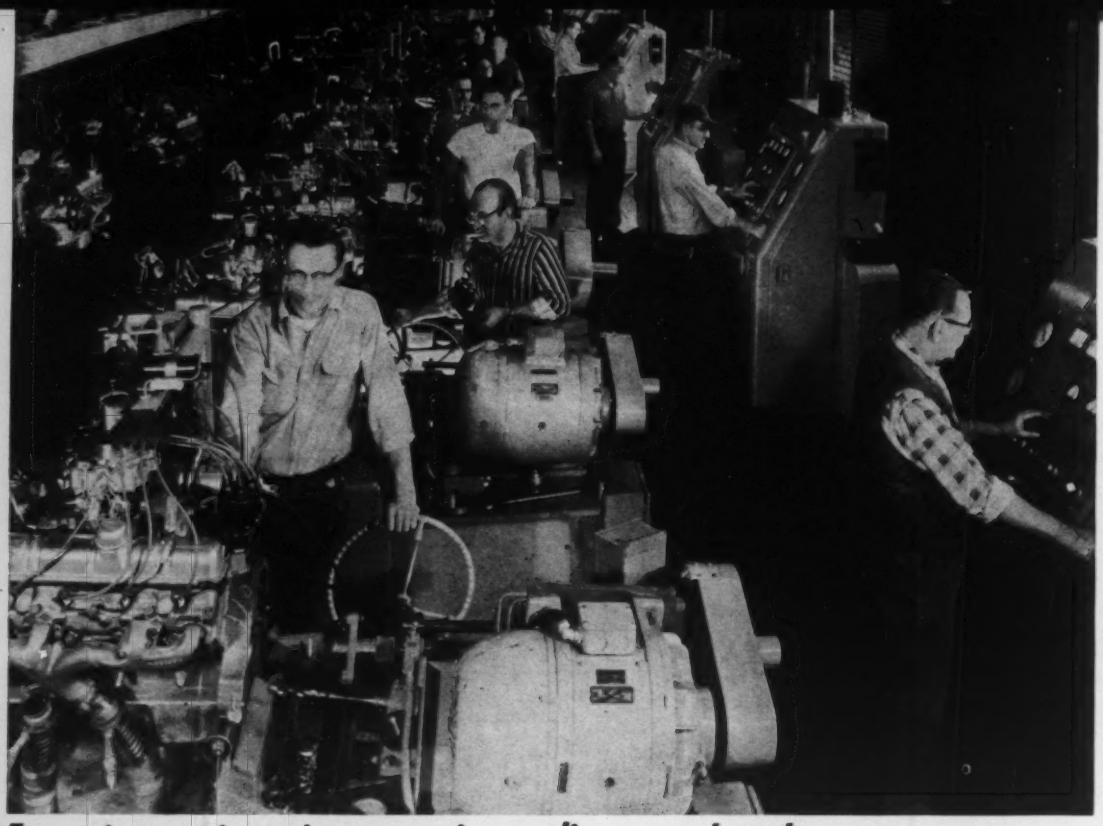
ATTENTION: STEAM USERS— The Atomic Energy Commission would like to sell low pressure steam to selected industrial plants throughout the U. S. It would be supplied by on-site atomic reactors producing 30,000 to 40,000 thermal kilowatts. Steam would be furnished at 15 to 200 psi at rates comparable with those of ordinary steam plants. Interested firms (those willing to buy the reactor at the end of five years) should write to Kenneth A. Dunbar, manager, Atomic Energy Commission, 9800 S. Cass Ave., Argonne, Ill. Deadline is June 19.

CITES TACONITE BENEFITS— An all-pellet blast furnace burden compared with 90 per cent ores or 40 per cent pellet burdens offers these advantages: 84 per cent more production with 34 per cent less coke; 30 per cent more wind; and a dust reduction of 55 per cent. That's the opinion of George H. Todd, assistant manager, Ashland (Ohio) Works, Armco Steel Corp. He also predicts that in 1981 40.6 per cent of iron ore consumption will be taconite and that blast furnaces 32 ft in diameter will produce 4000 tons of iron on 700 lb of coke per ton.

MAKING CERAMIC HONEYCOMBS— The "how to" part of making honeycomb sandwich shapes from inorganic ceramics is explained in a new report (PB171148) released by the Department of Commerce, Washington 25, D. C. An alumina silica paper impregnated with an alumina silica slurry is employed during forming. After firing, it is an integral part of the refractory system.

DIE LIFE IMPROVED— Wear plates made of a slippery plastic material called Celoron have already outlasted their steel counterparts 50 per cent in an auto fender die, says Budd Co., Philadelphia.

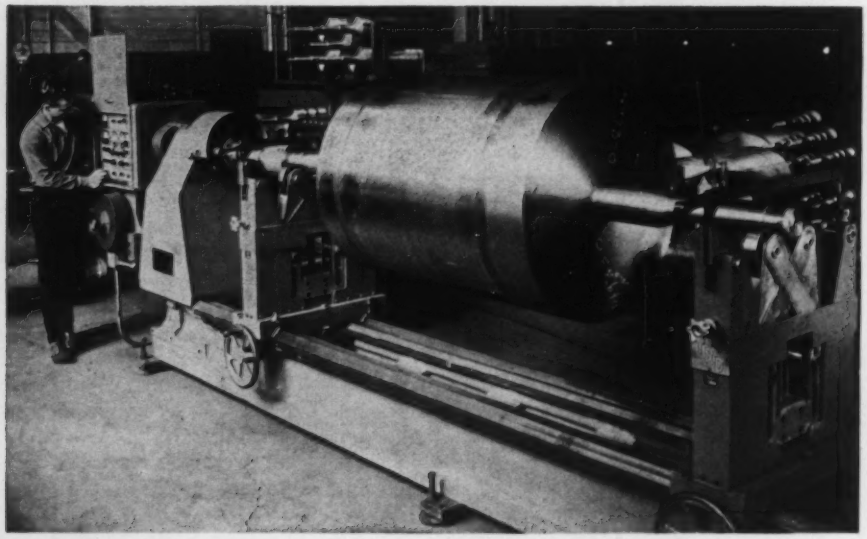
UPS CONVERTER EFFICIENCY— A new thermionic converter developed by Thompson Ramo Wooldridge Inc., Cleveland, achieves 13 per cent efficiency at 200 watts. (About 9 per cent has been considered good.) It is heated by electron bombardment. The firm has also developed a means of accurately fabricating a 5 ft solar concentrator (used with the thermionic converter in space systems) which reduces the "circle of confusion" at the focal point to $\frac{3}{8}$ in. Surface reflectivity is 92 per cent.



Expansion continues in automotive quality control, and . . .

Balancing Applications Increase

Popularity is growing in these areas:



Mill rolls make better finishes on flat products after balancing . . .

• LOOK FOR greater use of precision balancing equipment in manufacturing and maintenance over the next few years. Reasons: The need for faster machine and vehicle speeds, the desire for still smoother machine operation, and the promise of longer life for machines and components.

How precision balancing pays off: Savings in cutter heads (because of smoother machine tool operation) came to five times the cost of a balancing machine during its first year of use by an aircraft manufacturer. Machined surfaces of 33 microinches were obtained vs. 44 to 63 microinches before the balancer was used. And balancing of crankshaft-flywheel-clutch assemblies boosted mileage between engine rebuilds to about 135,000 miles for Burlington Truck Lines, Galesburg, Ill. Engines were rebuilt at 100,000 mile intervals before the balancing equipment was purchased.

• Market growth will reflect technological advances and more critical quality control programs.

Manufacturers of balancing equipment are seeking new markets. "The equipment doesn't wear out rapidly, so the replacement market isn't spectacular," says Werner I. Senger, vice president, engineering, Gisholt Machine Co., Madison, Wis. "We expect much of our market to be in new applications. But expansion in automotive quality control, more emphasis on vibration control in machine tools, and the replacement of obsolete equipment may stimulate sales in standard applications."

Modest sales increases are predicted by R. B. Annis, president, R. B. Annis Co., Indianapolis. A conservative forecast also comes from the Research Laboratories, Warren, Mich., of General Motors Corp. Substitution of missiles for manned aircraft has reduced requirements for standard type balancing equipment in military applications.

Note of optimism: "Our sales of equipment for dynamic balancing have increased about 50 per cent per year over the last four years," says Ralph T. Buscarello, manager, Industrial Balancer Dept., Stewart-Warner Corp., Chicago. "Market growth has been most noticeable in equipment for maintenance balancing and for the balancing of large, slower speed rotors. We expect that trend to continue." And sales increases of 50 per cent in the last three years are reported by Bear Mfg. Co., Rock Island, Ill., particularly in engine component balancers.

Machines for balancing miniature gyros have sold well in the last five years, says Micro Balancing Inc., Garden City Park, N. Y. A new line of high speed, bench type balancers for miniature parts or assemblies is offered by Gisholt.

• The need for balancing becomes greater as the rotating mass becomes larger, but the effect of speed increases is even more important.

Slight increases in rotating speed can cause serious increases in vibration. Reason: Doubling the mass of unbalance or its distance from the center of rotation (in larger parts) merely doubles the centrifugal force of vibration. But centrifugal forces caused by unbalances increase with the square of the speed increase. When the speed is doubled, the centrifugal force is quadrupled.

Static unbalance, which is relatively easy to correct, is often illustrated by a weight attached to the rim of a large wheel. If the wheel is free to rotate, it will turn until the weight is at the bottom of rotation. Balance corrections can be made by adding weight on the side opposite the unbalance, or removing weight from the heavy side.

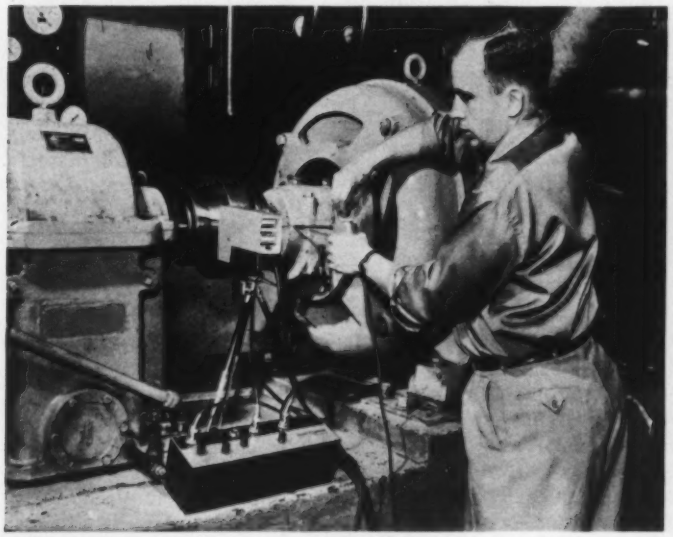
Dynamic unbalance can be illustrated by two wheels mounted at opposite ends of a rigid shaft. If the weights are on opposite sides of the shaft, the system won't rotate by gravity, even if the shaft is free to turn, because the static unbalances counteract each other. But if the shaft is caused to rotate, the weights would produce an unbalance couple. They would cause vibration and uneven wear on the supporting bearings. The correction: Dynamic, two plane balancing.

• Precision balancing makes for more efficient machine operation.

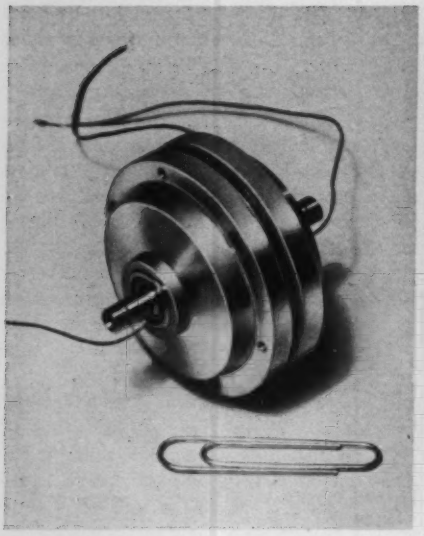
"Anything that rotates will turn in its best performance after it has been precision balanced," says Gisholt's Mr. Senger. "And that is true for rotating members as small as a 1/4 ounce gyro or a ship reduction gear that weighs 50 tons."

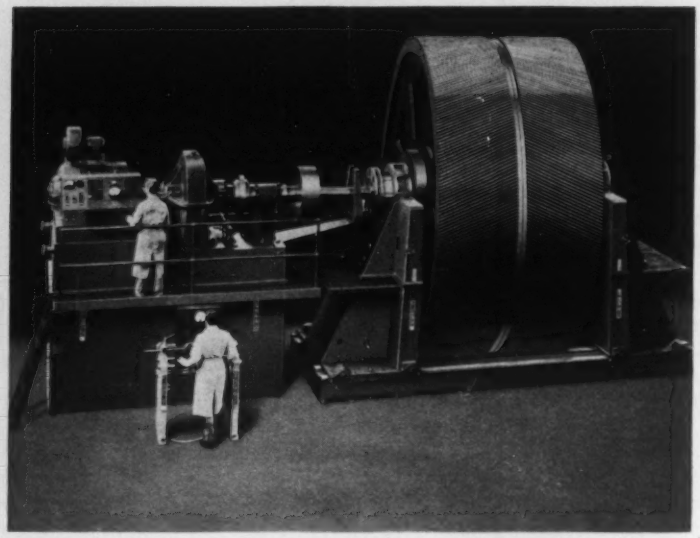
"Bearing life is increased 25 to 100 per cent, and seal life is boosted 50 to 150 per cent by precision balancing, with tolerances 5 to 10 times closer than in standard commercial practice," says Mr. Buscarello, of Stewart-Warner. "Nonmoving parts, such as truck cabs or machine supports, last longer because they are subjected to less vibration, which can cause progressive fracture from fatigue."

Many bearing distributors are asking their customers to run a continuing check on vibration in terms of displacement, to insure long bear-



Electric motors gain horsepower





Balancing puts smoother performance into tiny gyros . . . giant gears . . .

ing life and better performance. "Some of the largest bearing distributors are so impressed with the importance of the problem that they're adding vibration analyzing equipment and in-place balancers to their lines," says Eugene G. Hart, president, International Research & Development Corp., Worthington, Ohio.

Reduced vibration in vehicles, shop cranes, or machine tools cuts down operator fatigue. It also increases productivity, in many cases, by eliminating interference with other personnel or machinery.

Applications

• Better finish and closer dimensional tolerances are provided by precision balancing in machine tools and mill rolls.

"Cutting tool life can be increased 50 to 300 per cent on machine tools by precision balancing," says Mr. Buscarello. "And the benefits of precision balancing are noticeable in electric motor performance."

Horsepower output is increased, and current draw is reduced; motor winding life is extended.

All rotating components are balanced before machine tools are assembled at Gisholt. And electric motors that have been balanced to commercial tolerances by the supplier are disassembled and precision balanced for better performance.

A cradle type, dynamic balancer has been built by Wean Engineering Co. Inc., Warren, Ohio, to handle rolls for steel mill equipment. Electronic instrumentation and some of the mechanical components were supplied by International Research & Development Corp.

• Longer service and smoother operation are important benefits in automotive and aircraft applications. Noise elimination gets high priority in home appliances—and in submarines.

Balancing is vital in automotive crankshafts, flywheels, and clutches. That is the word from General Motors Corp.'s Research Laboratories. Other important areas in automotive manufacturing: Pulleys, automatic transmissions, brake drums, wheels, and complete engine assemblies. Accumulation of engineering tolerances in final assembly makes assembly balancing a must in production, says Mr. Senger. It's done by most manufacturers here and abroad.

Precision balancing is said to increase the horsepower of truck engines about 10 per cent. It's also practiced on aircraft engine components, such as crankshafts, pulleys, and generator or starting motor armatures. The practice is followed also on jet engine parts—compressors, turbines, blowers, and fans.

Rotating parts in liquid fuel rocket engines are precision balanced for optimum performance. Some missiles and space probes which have used spin stabilization for guidance have been precision balanced. Two firms that have built such machines: Space Technology Laboratories Inc., Los Angeles, and Gisholt.

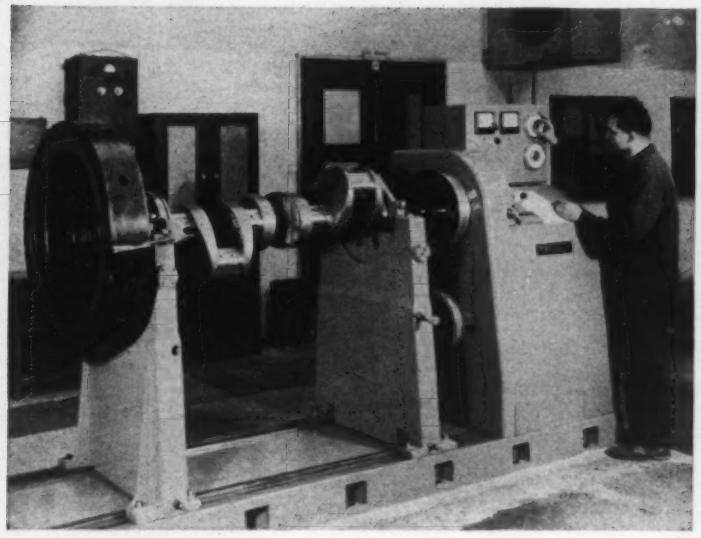
Noise is a nuisance in home appliances, so such items as electric motor armatures, pulleys, automatic washing machine tubs, and exhaust or vent fans are balanced. Furnace fans and blowers and air conditioning compressor rotors run more quietly after precision balancing.

Vibration is a more serious problem in submarines. Noises must be eliminated or minimized to keep the ships from being discovered by enemy detection equipment.

Manufacturing

• Balancing improves sales appeal.

Precision balanced products make for better sales demonstrations and help sell the customer. "The procedure might involve more manufacturing time," says Mr. Buscarello, "but it isn't right to consider only the shop cost. Total product cost must also include the cost of selling, which is much less with precision balanced products."



awkward crankshafts

Capital and operating costs for balancing equipment might increase manufacturing costs as much as $2 per item. But balancing can boost sales volume as much as 30 per cent. And it reduces service calls.

• Mass produced items must be balanced rapidly and accurately. Short run products may present more critical tolerances.

The manufacturer who is turning out a large volume of products (with moderate balancing tolerances) usually wants a balancing package—equipment that combines detection and correction operations in the same machine.

Small unbalances aren't critical in extremely large gears or rolls, produced in small numbers, but dynamic balancing equipment is gaining popularity for such workpieces. Metal removal for such balancing jobs would be measured in pounds. But gyros weighing ¼ ounce might involve vibration tolerances as close as ½ microinch, and metal removal measured in fractions of an ounce. Metal would be removed with a precision press and an extremely small drill (about 0.040 in. in diameter), cutting to a depth of about 0.003 in., measured by a dial indicator. Depth tolerance: About 0.001 in. In some cases, the drill tip cone might represent the total stock to be removed.

• Needed in balancing equipment: Easy operation and a short operator training period. The trend: Toward automatic or semiautomatic machines.

The time required to gain proficiency on machines varies. It takes one to two days to learn how to operate some kinds of portable equipment and as long as three to four days to become adept in cradle balancer operation.

Machines marketed by American Trebel Div., Greenwich, Conn., of Kurt Orban Co. are said to require only 30 minutes of training. And General Motors Research says its machines can be operated by personnel who have had no previous training after about 15 minutes of instruction. But GMR says its biggest sales point is easy maintenance. Machines with optical readout can be maintained by machine repair or toolroom personnel, without special tools. And units with electronic readout have plug-in components that can be replaced in a few minutes.

Maintenance

• Vibration analysis makes for more efficient machine tool maintenance.

"Vibration tolerances are being included in the routine inspection procedures of preventive maintenance programs," says International Research & Development Corp.'s Mr. Hart. "Many engineers have come to the conclusion that vibration is the earliest indication of misalignment and other causes of machine deterioration."

A preventive maintenance program suggested by IRD engineers includes determination of critical points on machines where vibration should be checked; establishment of vibration tolerances for each machine and realistic intervals between checks; and training of key personnel to interpret vibration readings.

• Motor and engine rebuilds are more likely to be successful if equipment includes precision balancing machines.

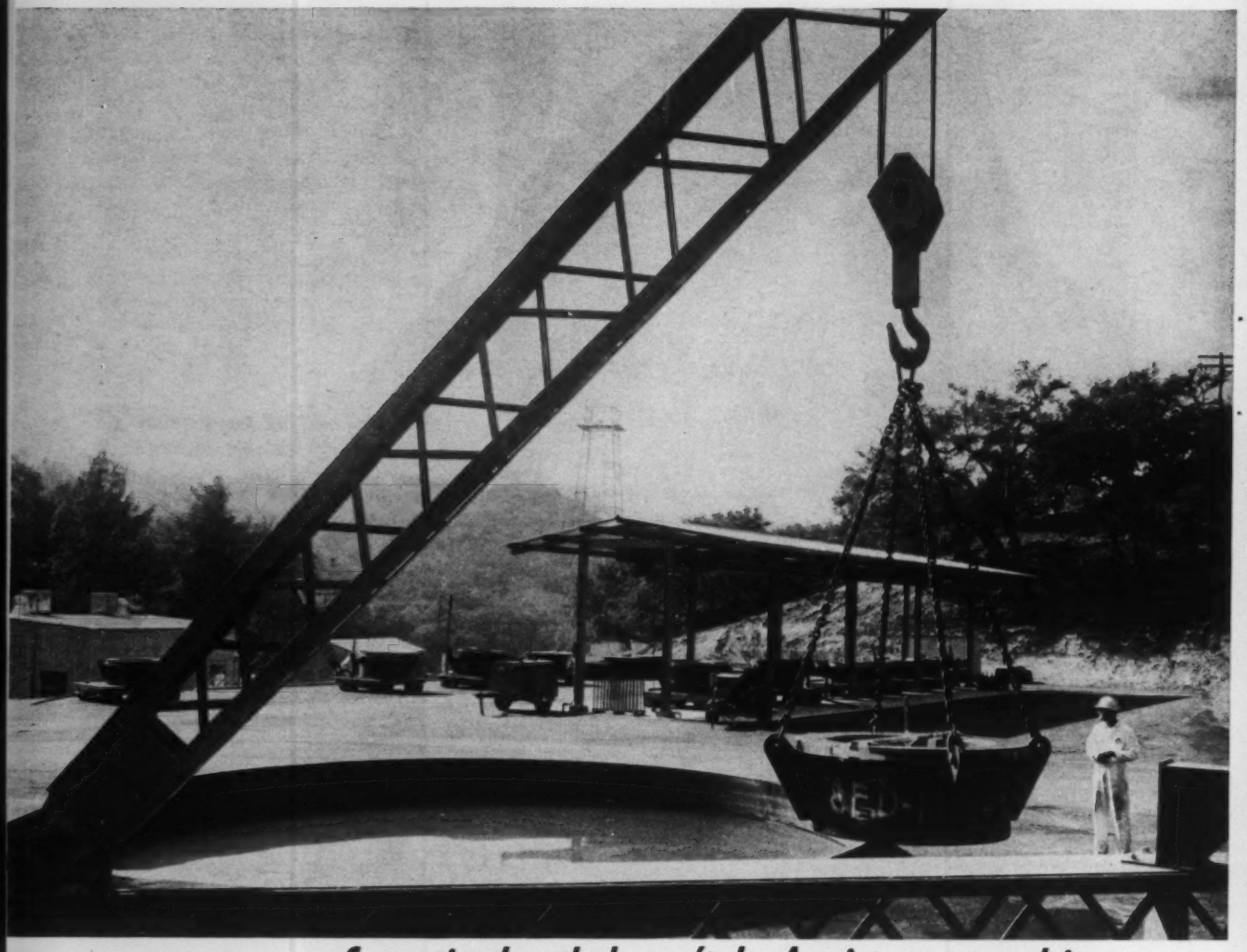
Rewound armatures that have been precision balanced are said to last much longer than new armatures that have been balanced to commercial tolerances.

Bearing life in high speed gasoline and diesel engines has been increased as much as 300 per cent through precision balancing of crankshafts. Lower speed engines in commercial vehicles have shown 25 to 100 per cent increases in time between overhauls.

• Here are the standards for equipment selection.

Portable equipment is the logical choice for maintenance work only if the rotor can be balanced in its operating position faster than it can be removed. It's possible to find the part that is vibrating, among many moving parts, and to determine if it is vibrating beyond allowable limits. Portable equipment is also useful for finding sources of vibration other than the rotor. And final balance is obtained in the assembled condition; that is desirable when it is difficult to center the part accurately for balancing after it is removed from the machine.

Closer tolerances can be met with cradle type balancers, and rotors can often be balanced while other scheduled maintenance is done. Cradle balancing is at least 4 to 6 times as fast as in-place balancing. It prevents the dropping of grinder dust, weld splatter, and drill chips on other machine parts. And the rotor is more accessible for weight corrections.



Conventional methods won't do, Aerojet expert explains . . .

How Explosives Form

• OUR MISSILE effort is becoming more dependent on explosive forming, believes G. C. Throner, manager, Ordnance Div., Downey, Calif., Aerojet-General Corp., a subsidiary of General Tire & Rubber Co.

The firm regularly uses the method to make major components, fore and aft closures, and domes for missiles like Polaris and Minuteman.

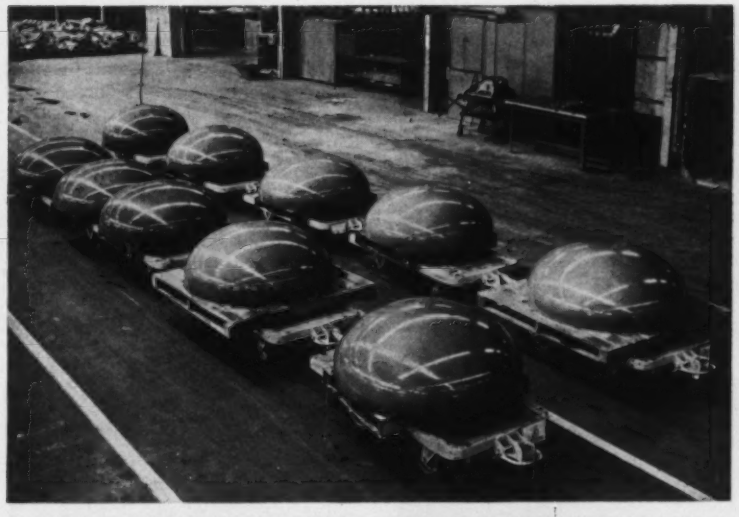
"The method is restricted to parts that cannot be fabricated satisfactorily or economically by more conventional processes," says Mr. Throner.

Other applications: Controlled cutting or parting along regular or intricate paths and production swaging, flattening, piercing, cladding, and ultrahigh density compacts of powdered refractory metals.

• Experts observe that metal thickness is not a limiting factor. Hard metals can be deformed to a greater degree by explosives than by conventional methods; thickening and thinning patterns differ radically from those produced by conventional methods.

The only practical limit on the thickness, strength, and size of the workpiece is the physical strength or size of the explosive forming facility, says Mr. Throner.

Normally, 54 in. domes (among the largest) will require four to six draw operations in a conventional

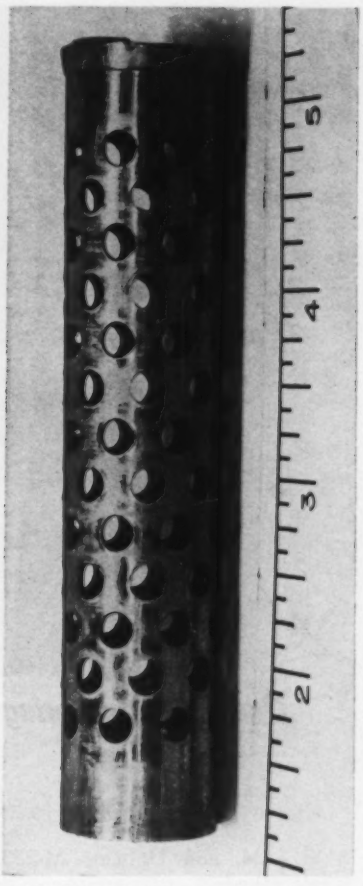


How Much Do These Domes Cost?

About $100, says Aerojet. Finished missile domes are 42 in. in diameter (plus or minus 0.020 in.), have a wall thickness of ¼ in. (plus or minus 0.010 in.), and a contour tolerance of plus or minus 0.025 in.

A comparable dome made by conventional methods costs $60. However, diameter, contour, and thickness tolerances are not closer than plus or minus ⅛ in.

"The point is," says Aerojet, "that conventional methods simply aren't satisfactory for many of today's missile requirements."



THIS IGNITER TUBE was formed, sized, and pierced in a single operation explosively. Tolerances approach those of machining

Space Age Parts

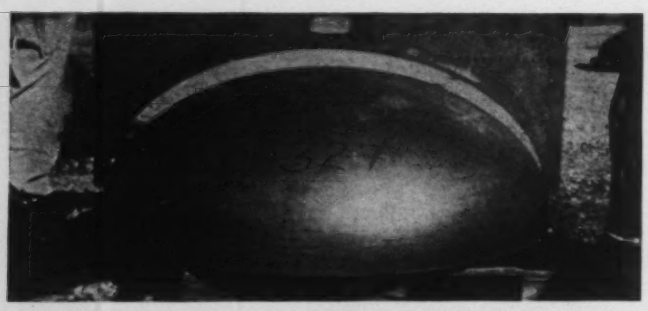
press with four to eight annealings between each draw. Explosives do the job in two operations and a single anneal at 1200° F.

The thickening and thinning which occur ordinarily are attributed to friction between die parts, says Mr. Throner. They are absent in explosive forming. Conventional methods stretch the blank; explosive methods may force the material (without stretching) into an even smaller area than the blank—metal flow can make the material thicker as well.

Elimination of thickening or thinning can be achieved by either preparing the blank or by suitably shaping the explosive charge. Such control simply isn't feasible in conventional drawing since thin-out patterns aren't predictable.

• All the common steels have been formed—also stainless, titanium, aluminum, Tricent, Vascojet 1000,

POWDER COMPACTS made explosively without binders approach the density of castings. This tungsten-nickel rocket nozzle has mirrorlike finish



Poor contour matches are easily corrected . . .

One operation brings them in line

AMS 6434, and Unitemp M-252, many of which pose problems in conventional forming. Magnesium, not normally formable cold, has been handled on a small scale.

The full rocket engine domes are explosively formed in a 1.6 to 1 elliptical contour. High nickel-chrome steels have been formed from blanks 0.040 in. to 0.5 in. thick; so have aluminum alloys up to 4 in.

One of the problems encountered at Aerojet was wrinkling along the edges. It was overcome by properly designing the pressure plates and better shaping of the explosive charge. Blank thickness determines both the thickness of the holddown and clamping pressure.

• Explosive forming is normally carried out in an open female die. Knowledge of the mechanics of explosives is needed.

The female dies employed have provisions for evacuating the space between the blank and the die walls. (That prevents heating of entrapped air—it sometimes gets hot enough to burn the metal.) An explosive charge is mounted some distance above the workpiece and the entire assembly—evacuated die, blank (in position), and carefully placed explosive—is lowered into water.

The shock wave is the major source of metal forming energy.

Secondary shock waves reflected from water surface and the tank walls may affect the process, says Mr. Throner. For example, if the water-air interface is close to the charge, the shock reflection reduces the impulse delivered to the workpiece.

• Aerojet sizes, irons out wrinkles, and straightens pieces distorted by heat treating.

Pieces may be explosively "set" to give better dimensional conformity and contour. Smaller quantities of explosive are required than for pure forming, and the operation can be done in light-walled tanks.

A major area at Aerojet for explosive sizing: The correction of metal shapes prepared by conventional means. More than 500 conventionally formed 54 in. domes were handled last year. True diameters within 0.010 in. are easily achieved. Contour deviations of 0.5 in. have been cut under 0.020 in.

Other problems of conventional forming that can be eliminated by explosive sizing: Mismatch between dome and chamber diameters; heat treatment and welding distortions.

• Other processes now being developed may be available shortly for general use. An example: Powder compaction. Primary advantage: You can achieve extremely high pressures with reusable units that cost only a few dollars.

Research into explosive compaction at Aerojet shows that interstitial bonding materials are not needed. That eliminates one source of weakness and increases the potential density of the finished compacts. Aerojet has tried zinc oxide, tantalum, tungsten, molybdenum, tungsten carbide with binder, tantalum carbide, beryllium, and other hard, refractory metals.

Densities achieved have closely approached those of castings. Green compacts range from 88 to 92 per cent of theoretical. Here are some of the results achieved after sintering: Tungsten, 92 per cent density; tantalum, 97 per cent; molybdenum, 95 per cent.

Another example: Altering the cross sections of both hollow and solid forms (swaging). Aerojet has rapidly joined thin walled pipe sections that way. It appears that a low cost, high speed tube coupling technique may shortly be available for military or commercial use. One possible application: Assembly of space stations.

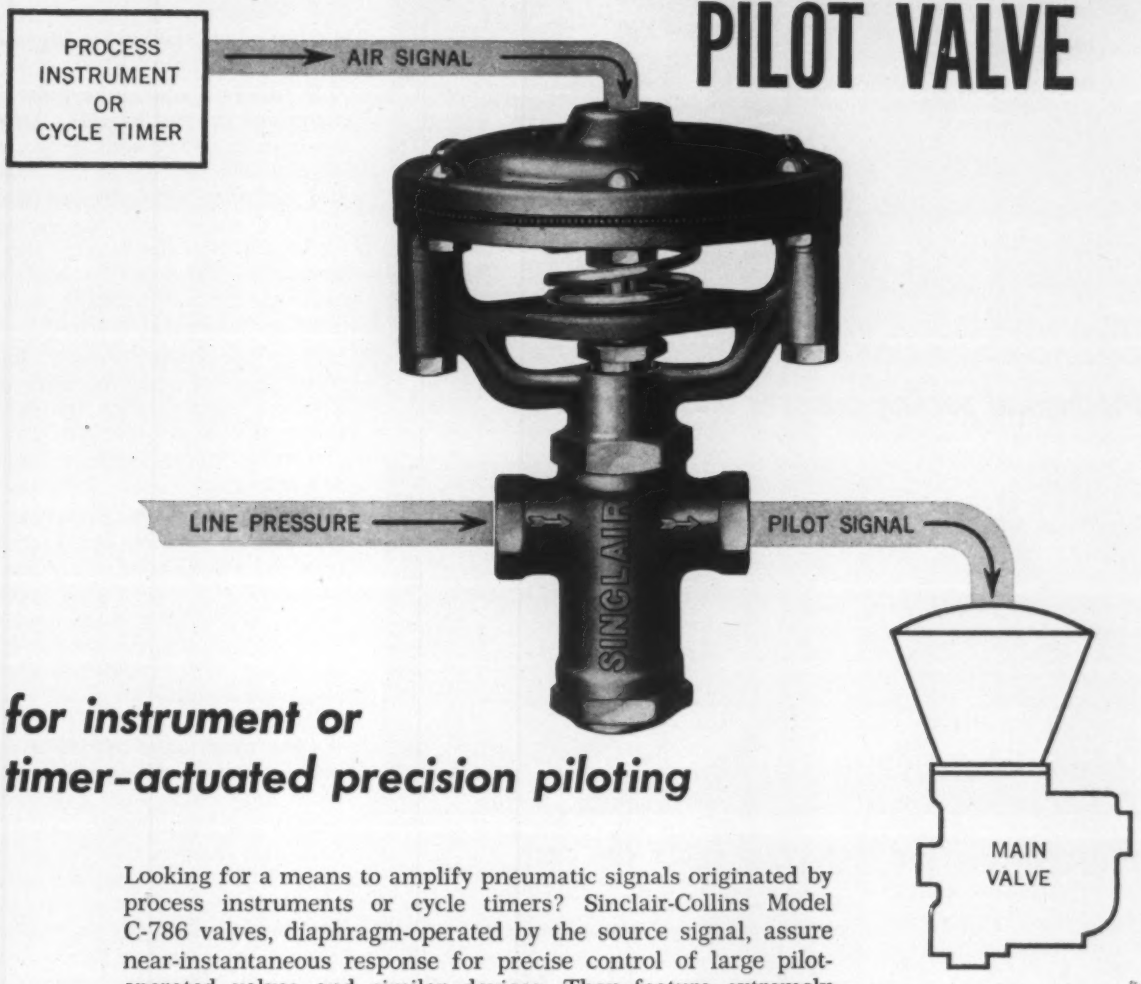
Explosive plating of refractory materials in thick layers on steel has been done in preliminary tests. Rapid advances seem certain, and Aerojet suggests the technique will shortly be tried in fabrication of special components like rocket nozzles.

Multiple piercing of thin sheets during sizing is also practical.

Aerojet's explosive forming installation has five forming tanks ranging from 8 ft to 20 ft in diameter. Two, mobile, 15 ton cranes and one, stationary, 30 ton crane are employed for die handling. A building with a full length monorail houses the die assembly area.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Compact, low-cost SINCLAIR-COLLINS PILOT VALVE



for instrument or timer-actuated precision piloting

Looking for a means to amplify pneumatic signals originated by process instruments or cycle timers? Sinclair-Collins Model C-786 valves, diaphragm-operated by the source signal, assure near-instantaneous response for precise control of large pilot-operated valves and similar devices. They feature extremely short stem travel, from closed to fully open, and a flow area equal to ¼ in. standard pipe.

Space a problem? The Model C-786 measures but 5⅜ in. high . . . is only 3⅞ in. in diameter. Cost a problem? You'll find this valve, with all the built-in quality features found in every S-C valve, priced attractively.

Models for air, steam, hot or cold water, or inert gas service; bronze, ductile iron or stainless steel bodies; 2 or 3-way; 20 to 50 psi signal, 125 psi main valve; tapped ¼ in. NPT. Ask your nearby Sinclair-Collins Field Engineer to show you how the Model C-786 fits your instrumentation control system.

The SINCLAIR-COLLINS VALVE Co.
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)
AKRON 11, OHIO

For more information, write for Bulletin 59-SC. Address The Sinclair-Collins Valve Company, Akron 11, Ohio, Dept. S-661.

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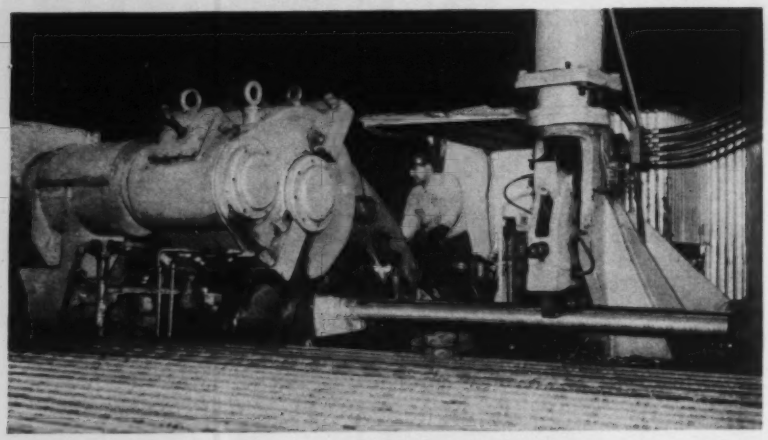

Mechanical peeling removes most flaws . . .

Magnetic particle inspection spots the rest

Tubing Quality Is Built in —Tests Cannot Produce It

• "INSPECTION doesn't produce quality," says C. F. Emish, metallurgical engineer, Youngstown Sheet & Tube Co., Youngstown. "It measures the success of a quality control program and points the way to product improvement." His example: Production of seamless tube rounds, which must be free of flaws for subsequent piercing.

The job of building quality into semifinished steel begins in the open hearth shop and continues through rolling, conditioning, and inspection at the company's Brier Hill Works, Youngstown. Rounds are taken across town to the company's Campbell Works or to the Indiana Harbor (Ind.) Works for piercing and further processing. They are made into a variety of seamless pipe products—oil country casing, tubing, and drill pipe, or line pipe and pressure pipe.

• Good surface on ingots—and on the products rolled from them—can be attributed to proper melting practice.

Incoming materials are inspected and checked chemically before the heat is charged into the open hearth. Example: Scrap is inspected for freedom from undesirable alloys. Limestone, alloying materials, and fuel oil are checked for physical and chemical properties.

An accurate account is kept of charge and material weights. After the scrap is melted and the working period begins, the bath is handled according to its temperature, which is read several times during the heat with immersion type thermocouples. The aim: To maintain optimum carbon-temperature relationships throughout the heat.

Close temperature control improves slag and steel chemistry at tap time. And holding the bath temperature in a prescribed range also makes for good quality ingots and minimizes pouring difficulties.

Ingot molds are cleaned and coated, then checked by an observer from the metallurgical department for cleanliness, coating quality, and temperature. (Mold drags are rotated, or cycled, so the ingot molds are at the right temperature when ingots are teemed.)

• Close temperature control in the soaking pits and rolling mills, combined with up to date inspection, helps insure high quality.

Heating practices, final ingot temperature before rolling, and total pit time are determined by the chemical analysis of the ingots. Transit time (the period between tapping and charging of ingots into the pits) is closely controlled. Average time: 2½ hours.

Surface quality of the steel in process is checked by an inspector and metallurgical observer as ingots are rolled into slabs or blooms in the plant's 44 in. blooming mill. For some alloy steels, cooling water is shut off from the work rolls during breakdown passes. That helps prevent corner cracking, caused by chilling effects that are more pronounced at the corners of sections being rolled.

Finishing temperature on the bloomer is held between 2080 and 2110° F. Those temperatures are read by the metallurgical observer with an optical pyrometer. But electronic equipment that will read and record finishing temperatures is being installed along the rear table of

METALGRAMS

. . . news of "Electromet" ferroalloys and metals

UNION CARBIDE METALS

JUNE 1961

NEW ECONOMIES IN MAKING STAINLESS -- New oxygen-blown refined chrome allows savings three ways: (1) The alloy has a lower price due to economies in oxygen blowing ferrochrome. (2) Reduced carbon and silicon contents allow greater use of this low-cost chromium in the charge. By using more refined chrome in the charge, less chromium as low-carbon ferrochrome is needed later in the heat. (3) Less lime is needed to neutralize silica formed during decarburization. (The lower silicon content of the alloy forms less silica.) For more information, call your UCM representative or write for "Even Alloys are Oxygen Blown" in the Summer 1961 issue of UNION CARBIDE METALS REVIEW.

* * *

BAGS BOOST YIELD, CUT COSTS -- Tight control of silicon used for ladle deoxidation of open-hearth heats gives improved ingot structures. As a result, fewer rejections are obtained in the finishing mill and mill yields are improved. Bagged 50 per cent ferrosilicon provides closer control over deoxidation than loose alloys. The bags give higher and more uniform silicon recoveries. They also give better control of semi-killed ingot structures, improving the surface of plates and reducing rejections caused by over-deoxidation (pipe). One producer improved mill yield by 1.5 per cent and saved about $0.60 per ton. For more information, write for F-20,121 and F-20,128.

* * *

TOP BLOCKING PERFORMANCE FOR OPEN-HEARTHS -- Silicomanganese blocks meet the needs of today's fast-moving open-hearths. The fast-dissolving alloy reduces blocking time and allows better control of carbon content and alloy additions. Thus, you get lower alloy costs and fewer off-grade heats. Silicomanganese blocks also produce cleaner steel by reducing undesirable oxides. Mechanical and fatigue properties are therefore improved. Get facts and figures in a new 12-page booklet, F-20,166. Included are graphs showing production results.

* * *

VANADIUM...PUTS MUSCLE IN STEEL -- An important alloying element in tool steels, vanadium produces stronger, tougher tools that hold their cutting edge. Up to 5 per cent vanadium is used in high-speed tool steels to improve wear resistance and red hardness. In engineering steels, 0.10 to 0.25 per cent vanadium boosts strength and fatigue resistance. Vanadium also improves the high-temperature creep resistance of steam- and gas-turbine ferrous-base parts. For such additions, Union Carbide Metals offers ferrovanadium, vanadium oxide, and self-reducing vanadium. Contact your UCM representative for more information. Also, ask for the article, "The Elements That Surround Us: Vanadium," in the Summer 1960 issue of UNION CARBIDE METALS REVIEW.

* * *

UNION CARBIDE METALS COMPANY, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Ltd., Toronto.

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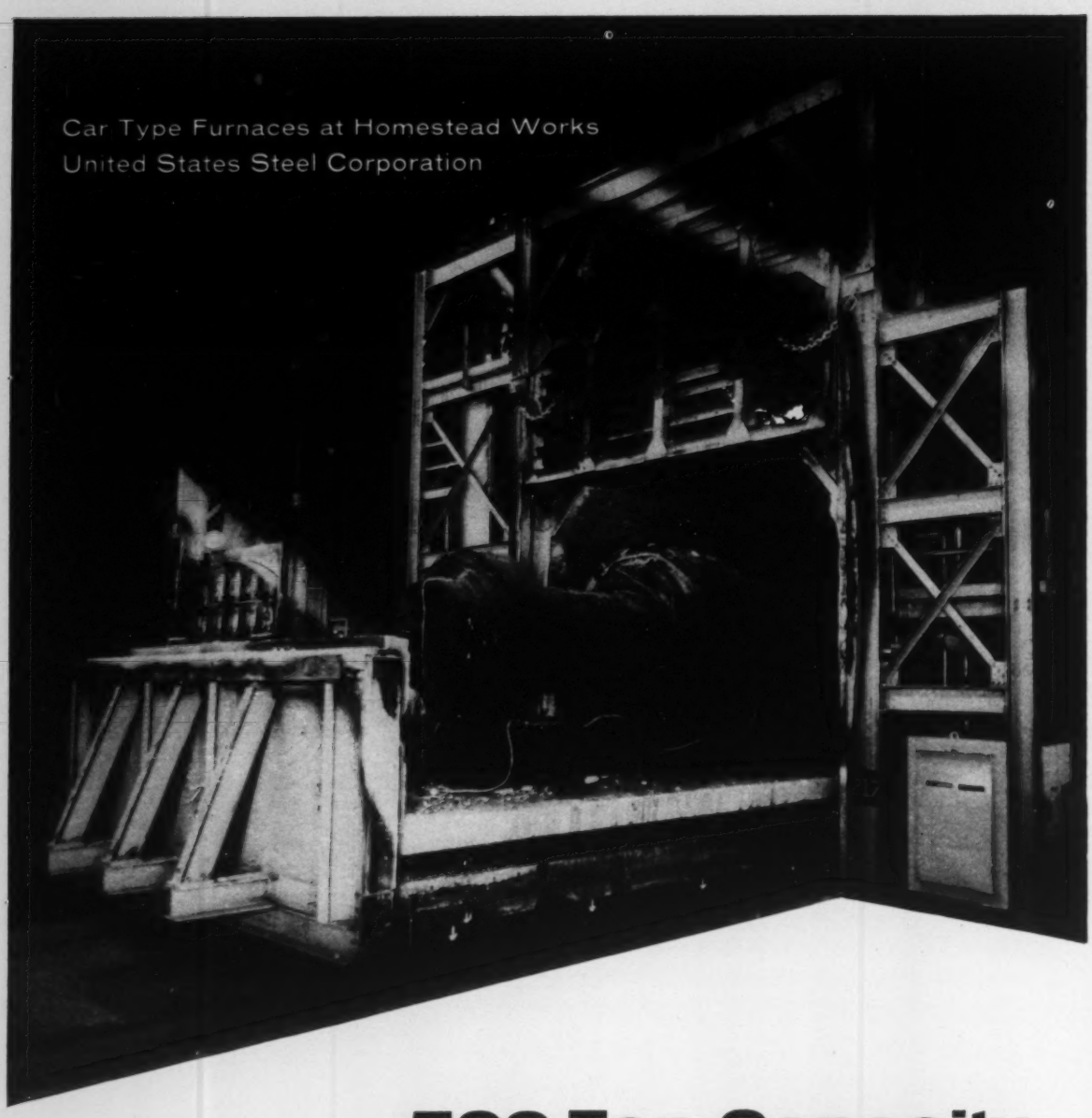

500 Ton Capacity Car Type Furnace

This Amsler Morton 500 Ton Combination Heat Treating and Forge Furnace is the largest of its type ever built.

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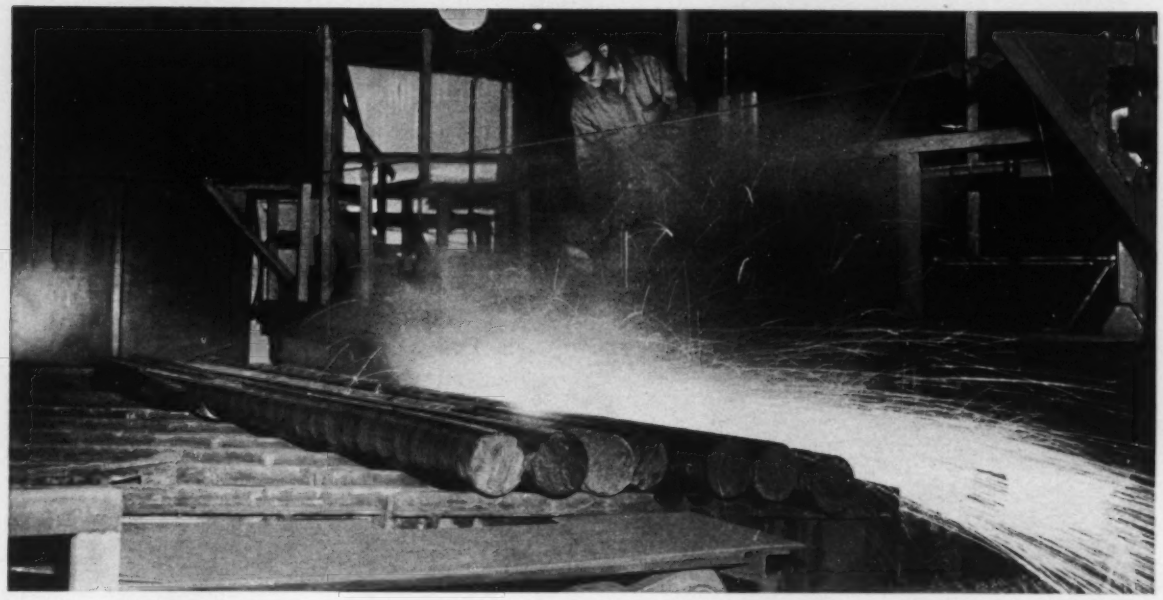


Final spot scarfing removes imperfections found in Magnaglo inspection

the blooming mill. (Recorders will be mounted in the roller's pulpit and at the soaking pits.)

Pipes and other defects in the cropped blooms are said to be more easily detected since installation of a new shear, built by Pittsburgh Engineering Co., Pittsburgh.

Sections from the round mill are gaged and visually inspected to insure proper size and permit immediate correction of mechanical type surface imperfections. Elimination of flaws is extremely important because of the severe hot work to which rounds are subjected in the piercing operation.

• Surface imperfections are removed from the tube rounds by mechanical peeling.

The turning operation, which is done on direct rolled and indirect rolled rounds, removes the surface from the full length of the round.

Operating personnel at the works feel that this is the most efficient production-inspection pattern: Direct rolling—from ingot to bloom to tube round—and mechanical removal of surface defects. Three machines at the works can turn out 35,000 to 43,000 tons of peeled rounds per month.

Usually, the peeler removes about 1/8 in. of the round diameter. In some cases, rounds are double peeled; that takes off about 1/8 in. more. Quality of the round or the finished tubular product, chemical analysis, and round size determine whether a round is double peeled.

All rounds for the company's No. 2 seamless mill (6 1/8 to 11 3/8 in. in diameter) are peeled. About 85 per cent of the rounds for the No. 1 seamless, stretch reducing mill are peeled and subjected to magnetic particle inspection. That same procedure is followed on rounds of certain chemical analyses for the No. 1 conventional mill.

• Invisible flaws are detected when peeled rounds are magnetized, covered with fluorescent, magnetic particles, and examined under ultraviolet light.

The Magnaglo inspection unit, supplied by Magnaflux Corp., Chicago, a subsidiary of General Mills, includes equipment for magnetization of the workpiece, a spray system that dispenses magnetic particles suspended in water, and a black light inspection booth. Two flame scarfing beds are integrated with the inspection unit.

Rounds moving through the booth are subjected to circular magnetization by a high amperage charge and flooded by magnetic particles suspended in water. Under ultraviolet light, the surface flaws (usually along the length of the round) appear as fluorescent yellow areas—ordinarily streaks or fine yellow lines. Operators place chalk marks on the areas where flaws are noted; then the rounds are taken to the spot scarfing stations.

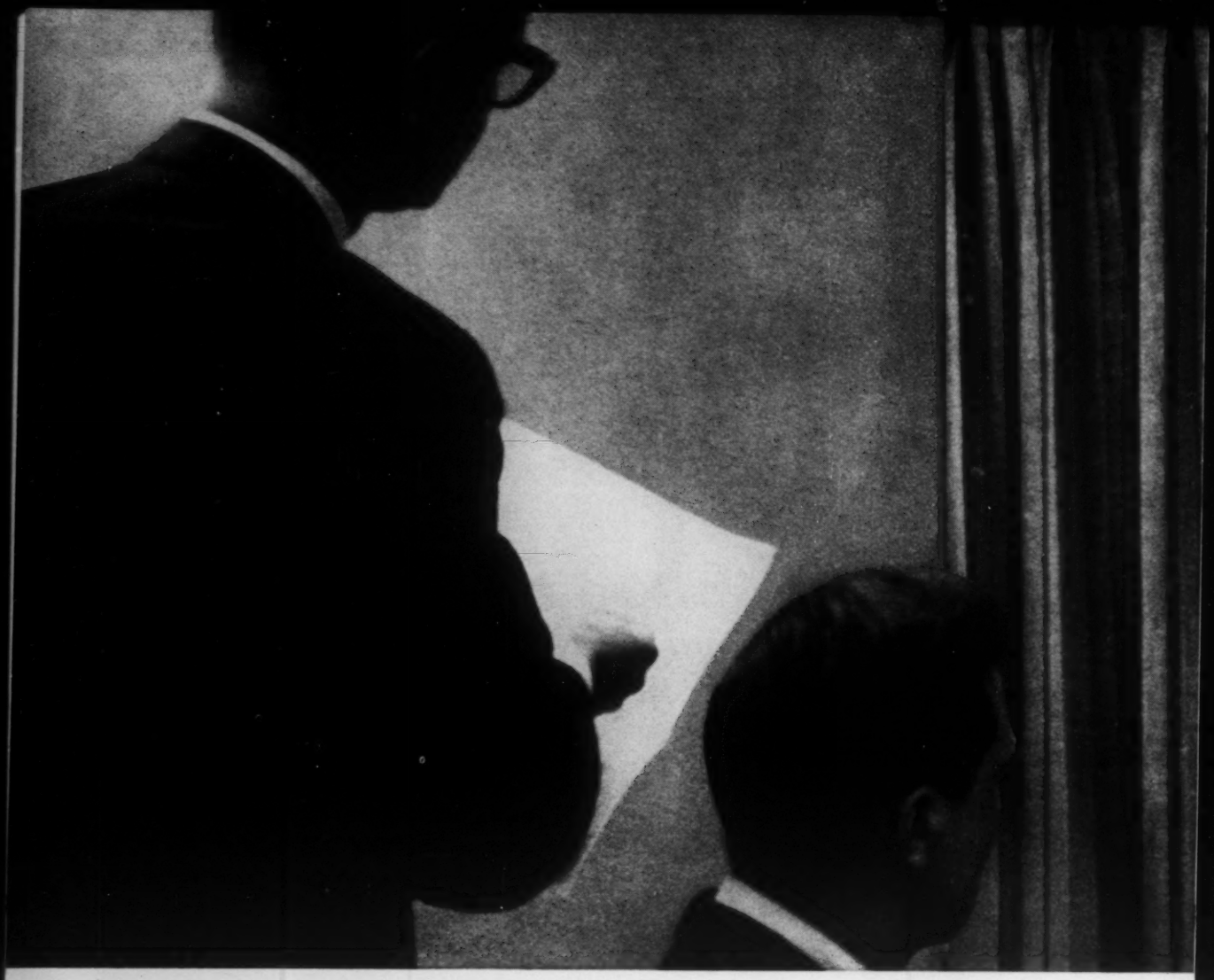
The company's metallurgical and operating personnel say the combination of peeling and magnetic particle inspection has made a significant reduction in reject rates. And the magnetic particle inspection is said to be beneficial in grading black (unpeeled) rounds.

• Skin scarfing is practiced on blooms that cannot be accommodated in direct rolling schedules.

Before the direct rolling, peeling, and magnetic particle inspection practice was developed for certain items, all blooms that were intended for critical quality seamless products were slow cooled, then skin scarfed. After reheating, they were rolled into rounds.

After cooling (alloy steels were cooled slowly), the rounds were pickled, then flame scarfed or hand chipped to remove surface flaws.

The all-over scarfing of blooms is still practiced on material not scheduled for direct rolling.



New IBM Inventory Management Simulator

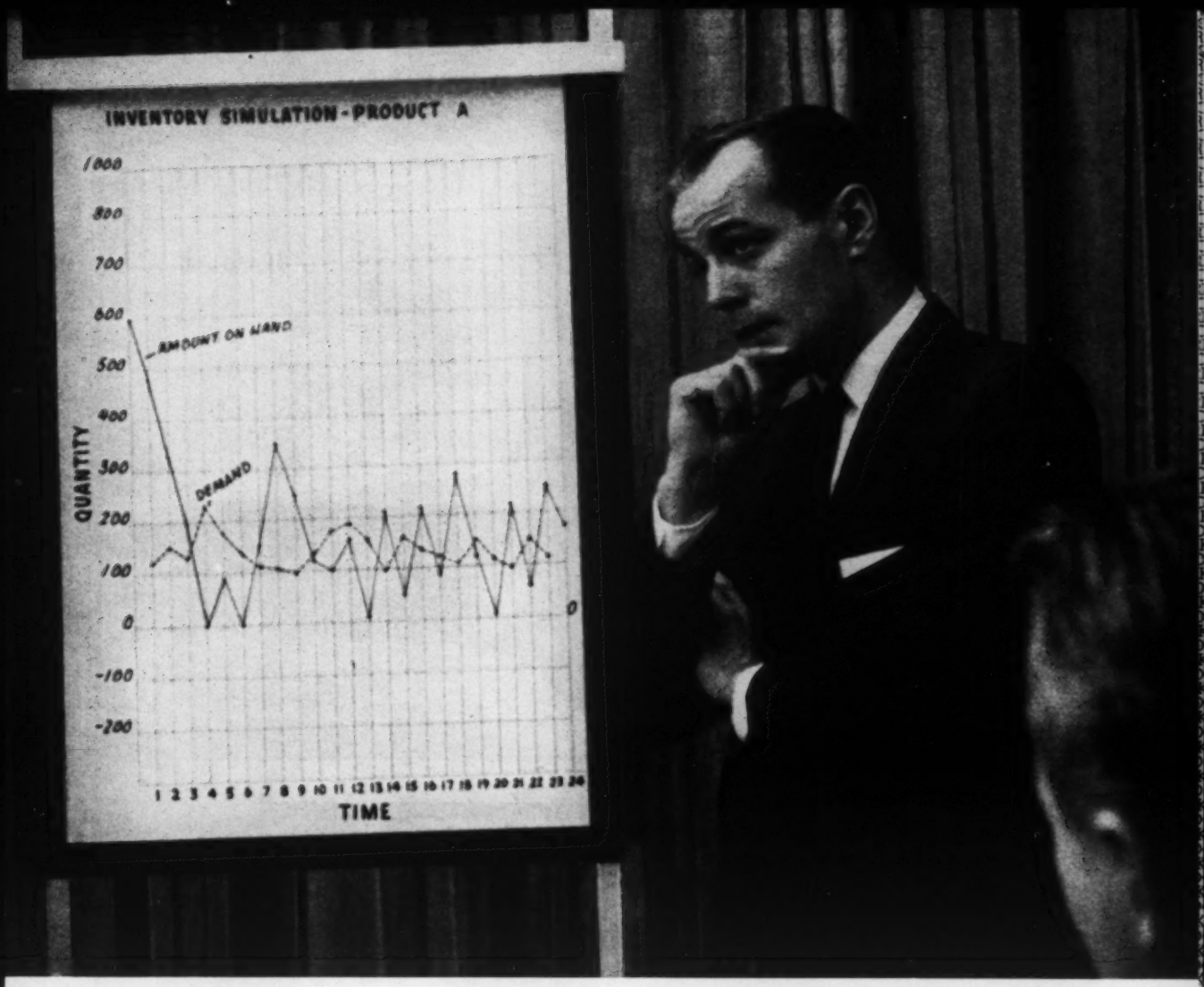
Management pre-tests inventory

How often have you wanted to peer into the future... see the probable results of your inventory policy? **Now you can.** An IBM data processing technique—Inventory Management Simulation—establishes the computer as an invaluable management tool for problem solving and decision making.

This technique lets you test and evaluate alternate plans electronically without disrupting present operations. In effect, it lets you turn *hindsight* into *foresight*.

Simulation is performed by creating within the computer a mathematical model of an inventory control system. Then the model is subjected to various demand situations. In every case, the computer reports what would have happened had this particular system been used to handle each situation. Of course, both the model and the demand factors can be endlessly varied.

Here's the important thing: Through simulation, the trial-and-error method of determining a course of action is performed within the computer—not during the course of your firm's business. This gives you a fast way to test plans under a wide range of conditions before actually putting them

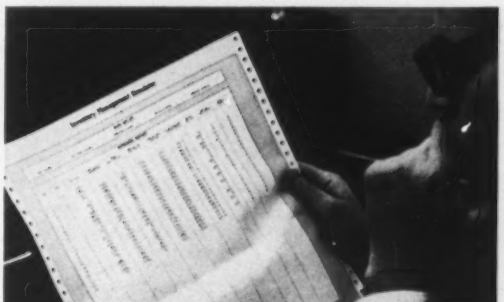


LOOKING AHEAD. Management has run a computer simulation of a proposed inventory plan. Company executives (above) now examine charted results showing how the plan might work, what problems might arise, where improvement might be sought. Print-out sheet (below) from an IBM computer contains facts needed to judge long-range results of a given inventory control plan. Inventory Management Simulation takes much of the guesswork out of planning.

decisions with electronic speed

to use. Unprofitable or inadequate courses of action show up in advance. You avoid them. And you select with confidence the system best suited to your firm's objectives.

Getting started. If you are an IBM customer, you can take advantage of the Inventory Management Simulation Program at once. IBM helps you collect the facts you need... and helps you set up a computer program to analyze them.

Ask your IBM representative to show you how this new technique can uncover *your* most effective inventory policy.

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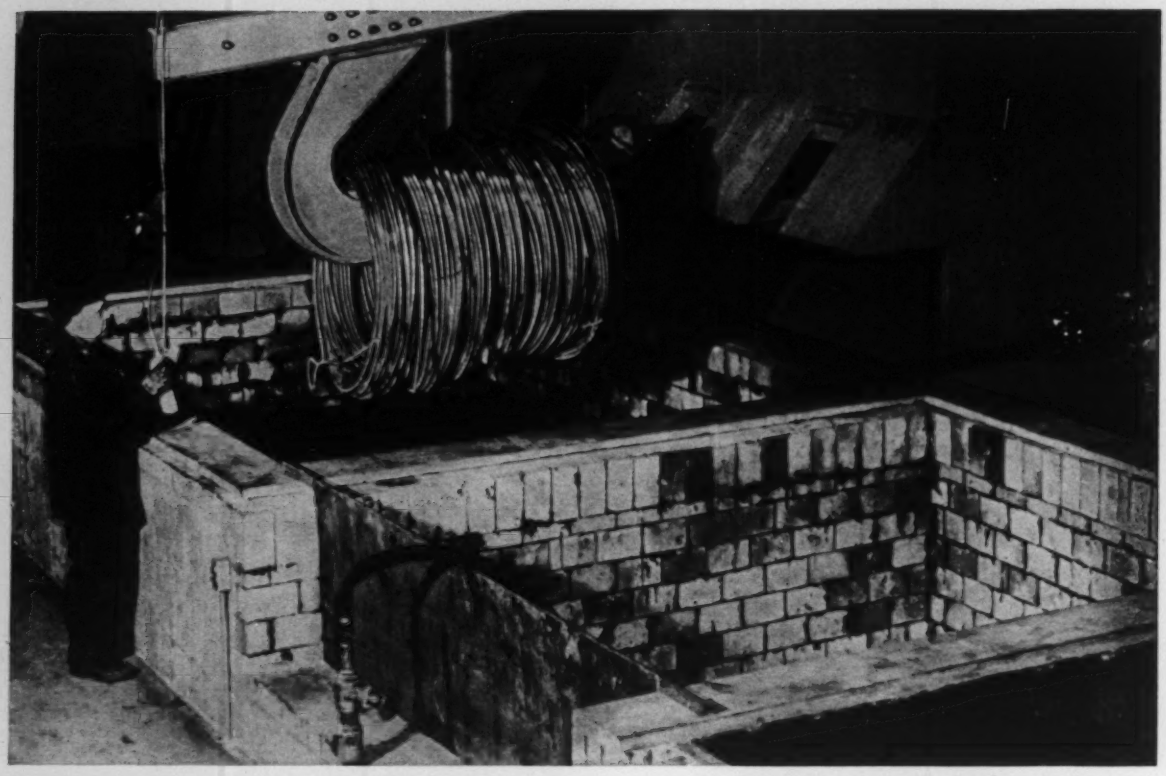


Membrane-brick lining makes this pickling tank corrosion resistant

Corrosion Proofing Requires Tailoring

• PROPER PROTECTION for tanks, foundations, floors, and lines exposed to corrosive solutions can cut maintenance outlay in most metalworking plants, says W. E. Smith, president, Ceilcote Co., Cleveland. And it's important to choose the best corrosion proofing in each application, he says.

Specifically cited are pickling, plating, and metal refining operations.

Solutions, operating temperatures, mechanical wear, and thermal shock vary in different applications, even in the same large metalworking facility. Result: No universal corrosion resistant material or application method can be prescribed without excessive cost or overprotection. So metalworking managers initiate each protection project with a careful analysis of the corrosion problem. Then the right combination of materials for optimum cost-service characteristics is selected.

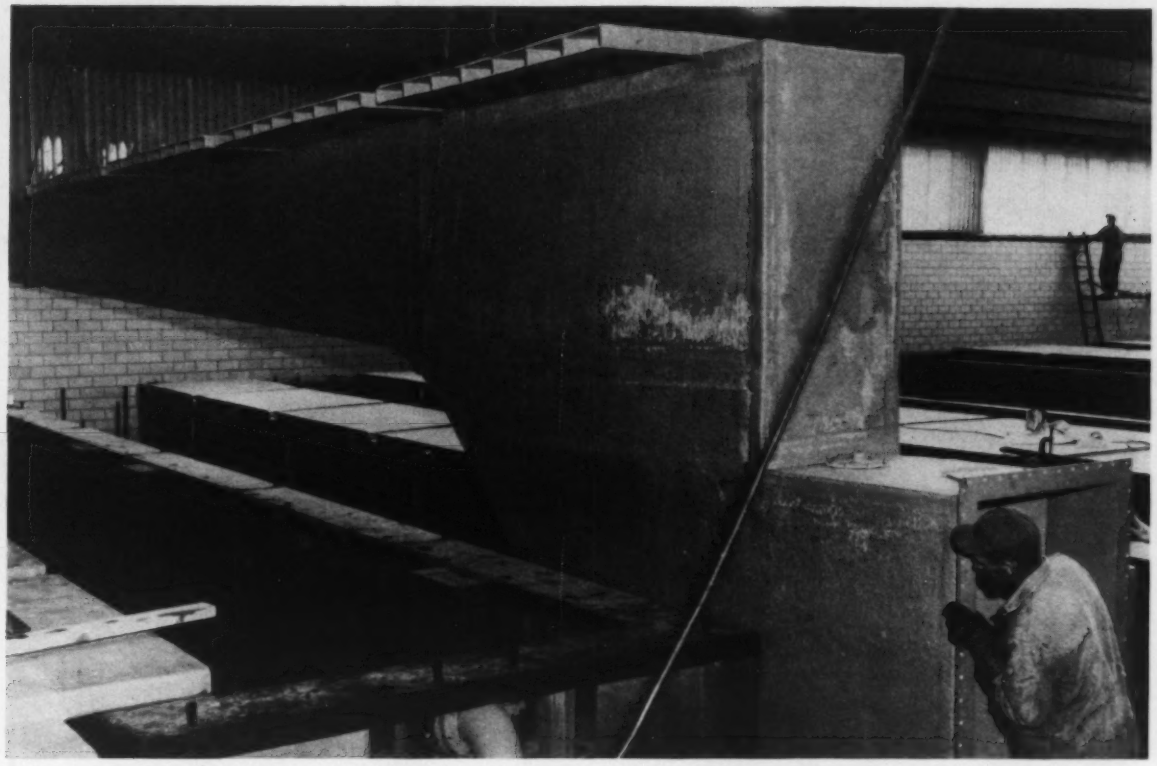
• Resistance to impact, abrasion, and thermal shock makes acidproof bricks desirable in many applications.

A flume for disposal of corrosive, abrasive steel mill scale was recently lined with bricks made by melting and casting an igneous rock. An epoxy resin cement was used to bond the blocks to their concrete base and seal joints against corrosive attack. The installation has already outlasted any combination of materials previously used in the flume.

• Processing tanks are usually sealed with a membrane lining; acidproof bricks prevent physical damage.

Corrosion proofing of a pickling tank for strip steel, wire coils, or tubing is a typical problem. Solutions ordinarily used: Sulfuric, hydrochloric, nitric, or hydrofluoric acids—or combinations—at 140 to 230° F. The tanks are constructed of steel or concrete to hold liquid heads, mechanical loads, and withstand shock. But they must be lined with a membrane impervious to the processing liquid.

Linings are usually flexible or semirigid elastomers, or thermosetting, resin-based compositions applied in thicknesses of 3/32 to 3/8 in. Where greater strength is needed, linings are often reinforced with glass fibers.



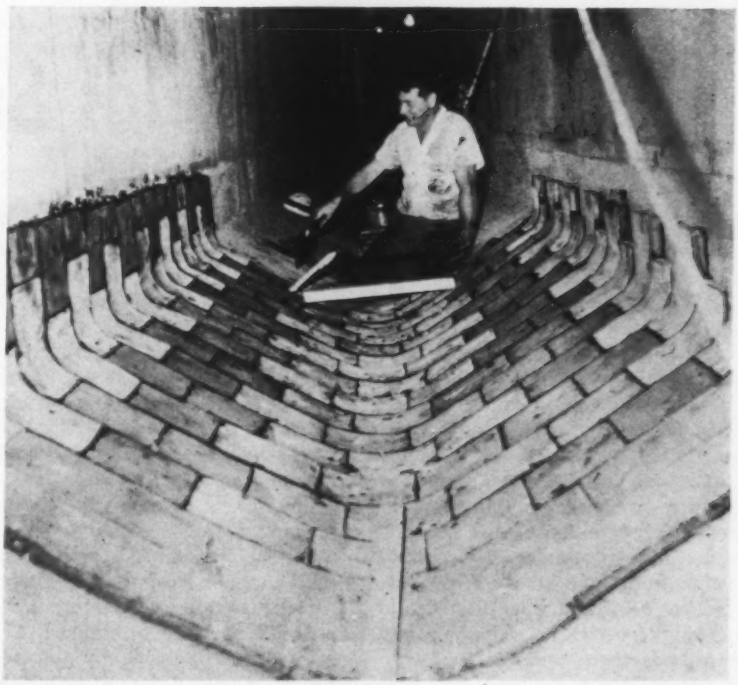
Corrosive gases are carried away in glass-reinforced, plastic ducts

• High strength, long service life, and relatively low cost is causing monolithic flooring and lining materials to gain popularity.

The monolithic materials, formulated from epoxy or polyester resins, offer extremely good corrosion resistance. They are said to provide two to four times the mechanical strength of high grade concrete, and they're flexible enough to bond permanently to the concrete base.

Combinations of bricks, monolithics, and linings reinforced with glass fibers are used extensively to make tanks, foundations, and floors in metalworking plants corrosion proof. And they are being used for dip and automatic plating installations. In the plating processes, many types of mineral acids, alkalies, and cyanides, or solvents—at temperatures of about 140° F—combine with hot water and steam to attack the tanks and floors.

Ductwork to handle corrosive fumes from plating or other processes is often fabricated from plastic reinforced with glass fibers.



Flume floor bricks resist abrasion from mill scale

Source: Committee of Stainless Steel Producers, AISI.

For joining chrome nickel steels, experts agree on techniques . . .

Stainless Welds Simplified

• WELDERS of stainless no longer will be hampered by hit and miss methods in the production of high quality stainless fabrications.

. The reason: Data just released by the American Welding Society, New York (Section Four, Welding Handbook), which contains recommendations of industry authorities on techniques, metallurgical principles, and processes for arc and resistance, welding and brazing austenitic chrome nickel steels.

In addition to getting technical help from the new handbook, fabricators will note its influence in making contract specifications and standards more uniform.

• High strength, welded joints can be produced in austenitic stainlesses by resistance methods with less difficulty than in most carbon and low alloy steels, but close control is necessary to insure corrosion resistance.

Welding currents for stainless are generally lower than those for mild steel because of the higher electrical resistance of chromium-nickel alloys. Tip pressures are consistently higher, too, experts state.

Lower heat conductivity produces a thermal gradient in the stainless welds which is considerably steeper than in mild steel welds. Quality, therefore, is more susceptible to variation in welding conditions. That is further aggravated by the need for comparatively shorter welding times to avoid carbide precipitation.

A generally lower magnetic permeability aids those who must handle large pieces. As large masses enter the welding machine throat, it isn't necessary to compensate for changes in reactance.

• Spotwelded nuggets in stainless are extremely tough and ductile because they usually cool rapidly, an effect equivalent to quenching. High joint efficiencies are possible. Here are seven conditions necessary to good spotwelds in chromium-nickel alloys.

1. Welding current must remain the same at each weld, should be sinusoidal, and applied synchronously. Voltage variations must be less than 5 per cent. Autotransformers should be avoided.

2. Welding time should be brief,

held constant, and accurately controlled especially for high tensile grades of stainless. Time intervals less than 5 cycles should be avoided unless timing accuracy is better than ¼ of a cycle. Fully electronic timers are recommended for thin gages. A "hold" of ½ second for thin material to 1 second for ⅛ in. material is suggested for cooling spots after welding.

3. Welding pressure must be uniform.

4. Surfaces must be well cleaned.

5. Electrode pressure ought to be two or three times greater than that employed with mild steel. It should be constant.

6. Tips should be highly conductive (75 per cent), copper alloys harder than Rockwell B 70, and internally and externally cooled whenever possible. Tip dimensions affect diameter and thickness of the weld nugget.

7. The short circuiting effect of preceding welds must be measured and compensated by a suitable increase in welding current.

A spotweld cross section can be readily prepared by cutting through a sample and etching it in hot solution of 20 per cent nitric, 5 per cent hydrofluoric acids. The nugget will be clearly outlined; quality and approximate strength can be easily determined by measuring its diameter and depth of penetration. Blowholes or cracks are readily detected that way.

• Distortion of austenitic chrome nickel steels can be a problem since coefficient of expansion is greater than that of low or medium carbon steels.

In spotwelding, shrinkage can be reduced by keeping weld size at a minimum. Sheet stiffness and welding shrinkage are related to the amount of distortion. In general, the safe upper limit of spotweld diameter is four to five times the thickness of the thinnest sheet welded. Many small spots are preferred to a few large ones if distortion is an important factor.

Distortion and warping can be overcome to some extent by trip hammering. It is helpful to prestress all spotwelds and seamwelds thoroughly, a row at a time, at the end of each pass and before the next welding operation. Thus small changes in dimension are not cumulative.

Used as a replacement for pig iron . . .

Gunned Graphite Governs Carbon Content in Steel

• SAVINGS can be made in furnace time and operating costs in the recarburization of soft heats of steel by the pneumatic injection of graphitic carbon, says R. H. Amberger, graphite product manager, United States Graphite Co., Saginaw, Mich., a division of Wickes Corp.

The metallurgical carbon, which is said to be extremely useful as a replacement for pig iron additions, must be dense, nontoxic, and extremely low in moisture, tramp elements, and volatility. The material must have high oxidation resistance. It must dissolve quickly and quietly in the bath, without adding phosphorus or sulfur.

• Predictable results can be obtained with any size heat.

The carbon unites with oxygen in the bath without affecting other elements in the metal or slag, says Mr. Amberger. Steels with a carbon content of less than 0.20 per cent can be deoxidized without decreasing carbon content when 2 lb of carbon are added per ton of steel.

Reduction of the iron oxide in the steel can be predicted; oxide content can be decreased about 0.79 per cent when a pound of carbon is added for each ton of steel and initial carbon is about 0.25 per cent.

Satisfactory results have been obtained with a 10 ft long, 1 in., bare steel pipe, feeding 100 to 200 lb a minute. With the lance inserted through the slag and extending about 4 in. into the steel, carbon recovery rates are 40 to 60 per cent, depending on the initial carbon content of the bath.

Molten steel around the end of the lance receives the fastest and greatest carbon increase. Molten metal near the end of the lance is temporarily transformed into synthetic pig iron. But that concentration of carbon is dispersed almost instantly.

• Temperature doesn't drop during the treatment. Heat size isn't increased because the carbon is dissolved readily.

The bath isn't chilled, as is the case when cold pig is introduced. Instead, a carbon boil—initiated by the injection—causes an increase in heat transfer through the slag.

A quick temperature rise of 40 degrees can save ½ to 1½ hours of furnace time. Such a temperature increase is desirable when steel is ready to tap, except that the temperature is below the specified level, carbon content is less than required, or heat transfer through the slag is low because of thin, quiet slag. But when only the carbon content is to be changed, it's often more efficient to recarburize in the ladle.

Addition of pig iron for recarburization isn't always advisable. Quality control regulations in many mills prohibit tapping until at least an hour after the last hot metal addition. Pig iron adds weight to the heat, which is already large enough to provide a full ladle of steel. Result: Excess metal overflows into the slag ladle, and the slag blanket, which protects the steel from the atmosphere, is lost. Ladle skulls make for additional yield losses.

• Carbon waste and overheating of the furnace roof are avoided by careful control of feed rates.

If carbon is fed into the bath faster than it can be dissolved, the excess collects in the slag. In low carbon heats, that may cause foam to form. In higher carbon heats, the slag may become blocked, or killed.

Foaming isn't desirable because it reduces the distance between the furnace roof and the top of the slag. It also increases the heat reflectivity of the slag surface. Both conditions can cause overheating of the furnace roof.

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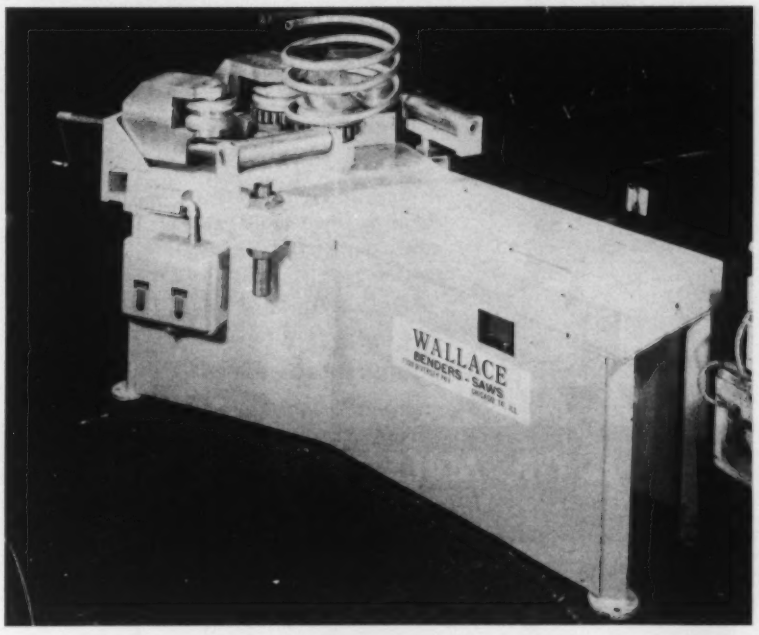
Rolling Machines Bend Pipe, Tubes, and Bars

THE NO. 460 Series of rolling machines can be operated either right or left. They're capable of doing all kinds of pipe, tube, round bar, square bar, and flat bar bending.

Tight coils, loose coils, flat spiral coils, wide radius bends, or short radius bends all can be done on the machines. One set of pipe rolls per pipe size is the equivalent to dozens of sets of fixed radius dies, says the company.

Maximum capacity cold bending, minimum radius bends: 2 in. pipe for the No. 462, 4 in. pipe for the No. 464, and 6 in. pipe for the No. 466 machine. In the same order, minimum radius adjustment is 9, 18, and 36 in. Capacity in round bars is 1½, 3, and 4 in. With square bars, it's 1¼, 2½, and 3½.

For further information, *write* Wallace Supplies Mfg. Co., 1304 W. Diversey Parkway, Chicago 14, Ill.

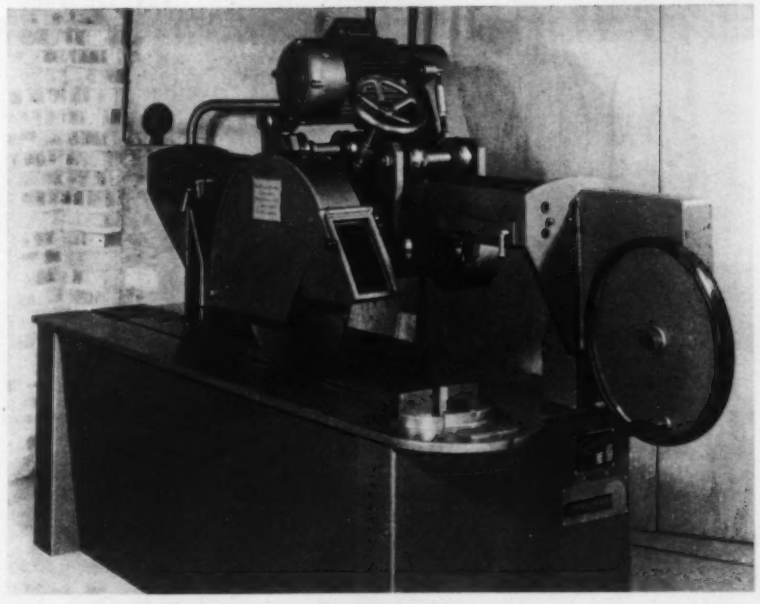


Traversing Saw Makes 12 ft Long Cuts

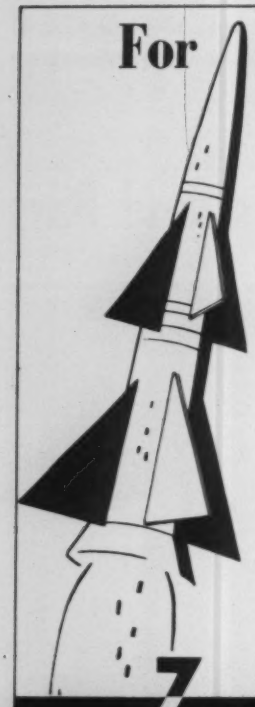
A LONG bed, traversing cutoff saw (Promacut Uni-9A) combines high cutting speed with the ability to make 12 ft cuts in stock such as grating and other structurals. No clamping or coolants are required.

The company describes action of its saw as semimilling. Speed of rotation and high torque moves the blade through stock so fast that heat is not absorbed and the result is an almost burrfree cut with no bluing of the metal. The approach of the saw to the stock holds the work in position.

The unitized head travels on eight V-rollers and is fed manually by a geared handwheel or it may be equipped for automatic feed and return. The Uni-9A is available in five sizes with cut length capacities ranging from 48 to 144 in. It's powered by a 12.5 hp sealed motor



For metals going places



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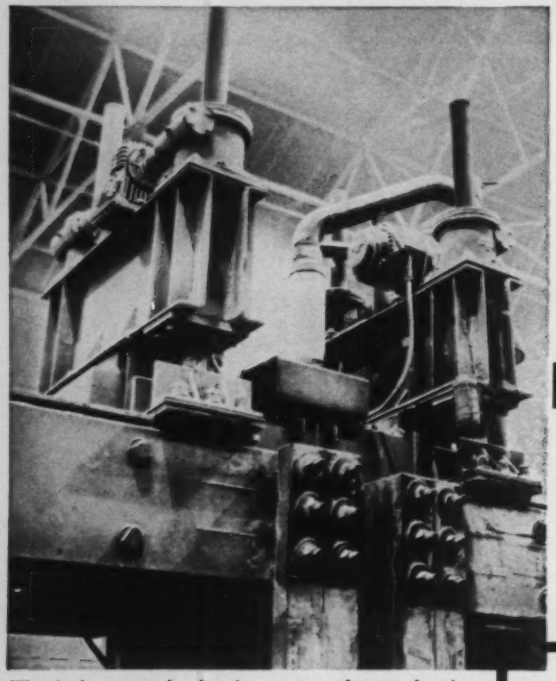

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(220/440 volts, three phase, 60 cycles).

Cutting times for the unit are 12 seconds for a 12 in., 35.0 lb ship channel; 1½ seconds for through cut on 2 in. OD, ¼ in. wall SA-106-B pipe; and 4 seconds on a 5 x 5 x ½ in. angle.

For further information, *write* Production Machinery Inc., 4941 W. Belmont Ave., Chicago 41, Ill.

Industrial Gas Burner Heats Solution Tanks

DESIGNED for mounting on and firing into an immersion tube, the Maxon Tube-O-Flame gas burner can do such jobs as heating solution tanks or industrial washing machines. Heat dispersion is uniform over the entire length of the tube.

Three sizes (6, 8, and 10 in.) have capacities of 800,000, 1,500,000, and 2,500,000 Btu per hour. Turn down range is 10:1. Field adjustment is accomplished by a single screw control of a regulator spring. Gas-air ratio is factory set.

For further information, *write* Maxon Premix Burner Co., Muncie, Ind.

Numerical Control System Fast, Simple in Design

SIMPLICITY of design and maintenance, speed of operation, and low cost are claimed for the Moog

Hydra-Point numerical control system. The unit (pneumatic-hydraulic design) can position a table at speeds of 350 to 700 in. per minute and it has positioning accuracy of ±0.005 in.

It provides point to point positioning for drilling and tapping and for straight line milling operations. The system can be applied on new machines or on existing drilling, tapping, and boring machines.

Tape preparation equipment (for example, a Flexowriter) may be used in programing the system. The system is available on Bridgeport and Burgmaster machines. DeSilvey Corp., East Aurora, N. Y., is authorized to make arrangements for applications of the system to existing machines.

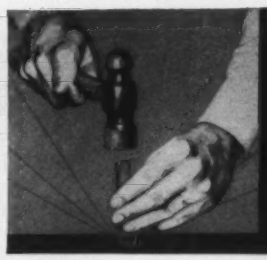
For further information, *write* Moog Servocontrols Inc., East Aurora, N. Y.

Piston Pumps Handle High Pressures and Flows

A LINE of angle type piston pumps and motors rated for pressures to 5000 psi are suitable for forming and extrusion presses, cargo winches, planer drives, and log carriages.

The company says a wide variety of controls, high pressure capability, instant response to controlling signal, and reversible flow makes the units usable in any application requiring high pressures and flows.

They're available as pumps or motors with fixed or variable displacement. The pumps deliver 120 gpm when operated at 1200 rpm



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29,335 hammer blows—and still marking cleanly—Pannier Letter and Number Stamps

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Type size identification
Added metal in Pannier fillet increases durability. Correct bevel gives clearer impression, longer life. Outside bevel longer than inside for protection of character face.

Made of the finest tool steel and correctly heat treated for best combination of hardness and toughness, Pannier single character stamps can take it! Scientific shaping and accurate engraving insure a long life of good, clear impressions. Available in letters, figures and special symbols, and in light, medium or heavy duty design.

Extra tough steel forging stamps for hot or cold, heavy duty marking

For stamping names, part or patent numbers, trade marks and similar markings, Pannier forging stamps are made in four styles:—Hand-style, fullered for wire handle and wood handle style with eye parallel or perpendicular to lettering. All are designed and heat treated for clear impressions and long service. All are covered by the Pannier Master Marker guarantee.

Supreme-Safe Holders with "Roto-Lok" for quick, easy number change

An easy, half-turn flip for Roto-Lok releases any or all of the steel type for fast change. A reverse flip locks them in perfect alignment.

Roto-Lok makes this Pannier Master Marker a time saver in number change and makes serial number marking fast and efficient. The hardened anvil at the base of the type slot keeps type in perfect alignment for equal impression. Machined from bar tool stock, the Supreme-Safe Holder has a heat treated striking head. Both anvil and striking head are replaceable for longer life of the holder itself. Made in hand or wood handle styles, for hot or cold marking

Write for literature

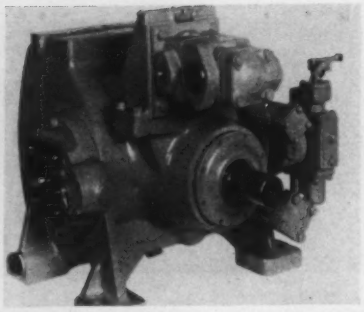
PANNIER MASTER MARKERS

386 Pannier Building, Pittsburgh 12, Pa.

MASTER PANNIER MARKERS

with atmospheric intake and 180 gpm at 1800 rpm when operated with supercharging, permitting the use of standard electric drive motors. Maximum displacement is 23.7 cu in. per revolution and maximum torque is 378 lb-in. per 100 psi.

With servocontrol, the variable displacement pump can be stroked from maximum displacement in one direction to full opposite in about



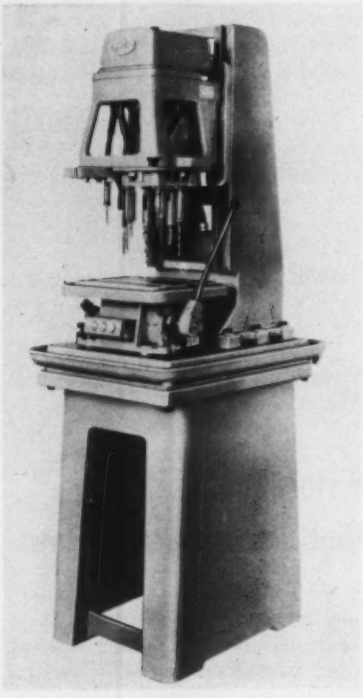
½ second, enabling output flow to follow the controlling signal precisely. The variable package with control and an auxiliary pump has a horsepower to weight ratio of about 3.2 lb per horsepower, based on 1200 rpm and 5000 psi.

For further information, *write* Vickers Inc., a division of Sperry Rand Corp., Box 302, Detroit 32, Mich.

Drilling, Tapping Unit Handles Small Part Work

A UNIVERSAL drilling and tapping machine, the Jarvis Dril-King, is a self-contained, compact unit that can handle small part production.

The standard unit comes with 12 spindle drivers and is able to obtain center distances to ⅜ in. minimum. Closer center distances are available with variations of the basic spindles. Work area on the standard model is 6 x 8¼ in.



One feature is a vertical feed worktable that brings the work up to the head. The unit is powered by a heavy duty motor through a V-belt drive. Four speed changes are possible. A range of optional equipment is available.

For further information, *write* Machine Tool & Attachments Subsidiary, Jarvis Corp., Middletown, Conn.

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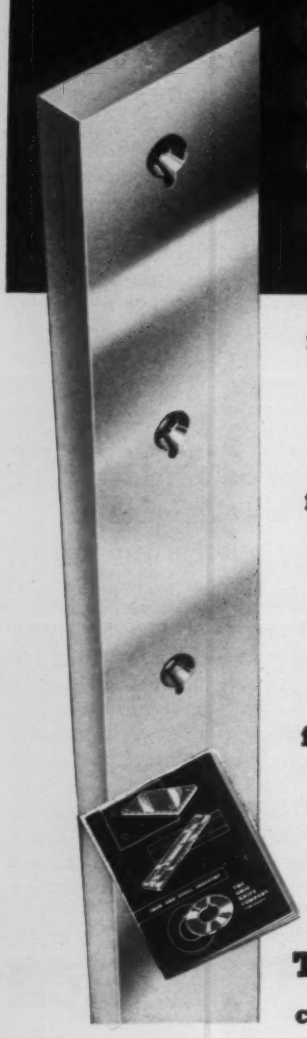

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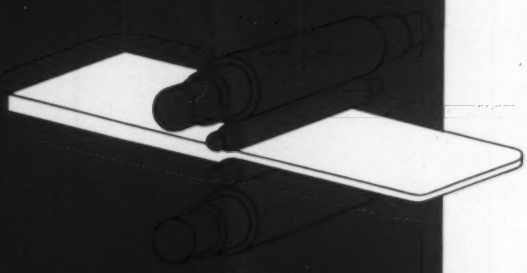

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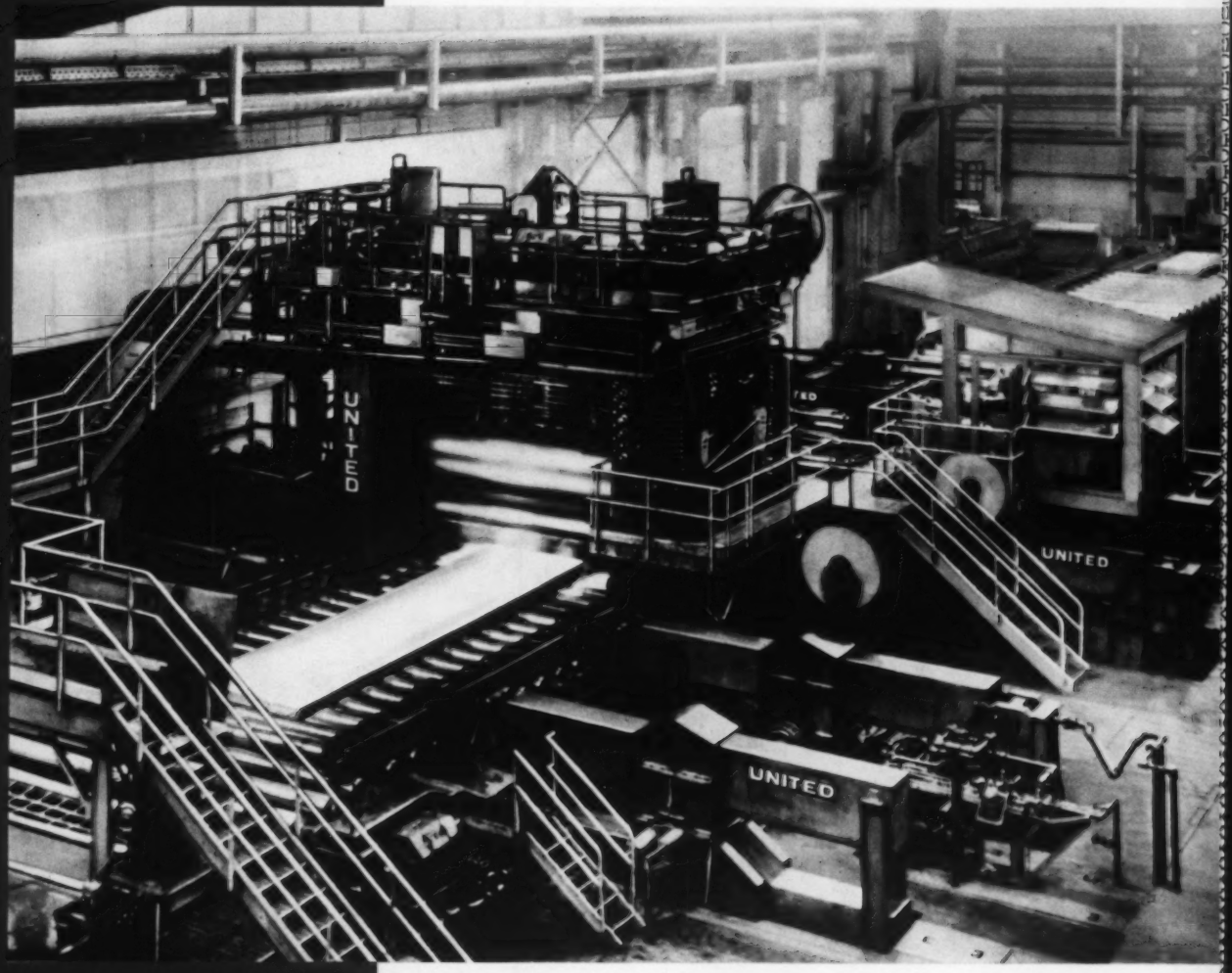

This is the world's largest mill of this type for rolling aluminum and is in operation at the Reynolds Metals Company Alloys Plant, Sheffield, Alabama.

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ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH 22, PENNSYLVANIA

Switching from aluminum to Zamak sliced casting costs in half on this Whitehead ball bearing bobbin holder. And with seven zinc die castings accounting for all the major working parts, overall costs dropped a neat 12%.

This high volume item is found on spinning frames in cotton mills—it's designed to take twenty to thirty years of rugged, day-in day-out service. Yet by using Zamak instead of aluminum, the wall thickness of certain parts was reduced from .065" to .050". This resulted in a decrease in material cost with no loss in strength. Whitehead Die Casting plans to bring their costs down still further by going to wall thicknesses of .032"—with the toughness of the parts still unaffected as far as their performance goes.

Besides the healthy cost savings directly related to the reduced wall sections, Zamak also provides Whitehead with a familiar success story—"faster and more economical production . . . longer die life . . . less rejects." Zamak gives you more for less — — —

WHITEHEAD BALL BEARING BOBBIN HOLDER

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Industrial Alcohol Storage

A guide to the bulk storage of specially denatured alcohol and proprietary solvents covers government regulations, suggested tank design, size, location, and auxiliary equipment (including pumps, pipe, fittings, valves, electrical grounding procedures, vents, and measuring devices). Technical Literature Dept., U. S. Industrial Chemicals Co., 99 Park Ave., New York 16, N. Y.

Pressure Piping System Welding

Bulletin 2112.2, "Welding Pressure Pipe Lines and Piping Systems," contains practical information on techniques and costs related to cross-country transmission and pressure piping systems. Procedural information for full automatic submerged arcwelding is presented. Lincoln Electric Co., 22801 St. Clair Ave., Cleveland, Ohio.

Selective Plating Process

An eight page booklet describes equipment, application techniques, and plating jobs that can be handled with the Dalic process (a method of electroplating localized areas of a workpiece without using immersion tanks). Sifco Metachemical Inc., 935 E. 63rd St., Cleveland 3, Ohio.

Metallizing Case Histories

Nine case histories show how products can be salvaged or improved with metallizing techniques. Examples cover flame spraying with metals in both wire and powder form. Specify "How to Save Money and Cut Downtime with Metallizing." Metallizing Engineering Co., Westbury, N. Y.

Foundry Operations

The current edition of *Foundry Practice* discusses the causes of common casting defects and their practical remedies. The illustrated story explains the chemistry of porosity, subsurface defects, and steam reaction. Also discussed is shrinkage porosity. Foseco Inc., P. O. Box 8728, Cleveland 35, Ohio.

Sensitometry Vocabulary

A 21 page booklet presents the elementary principles and terminology of sensitometry (study of the action of exposure and development on photographic emulsions). For those intending to study the scientific side of photography, the booklet serves as an introduction to the more comprehensive and detailed treatises. Ask for Sensitometry No. 211.982. Gevaert Co. of America Inc., 321 W. 54th St., New York 19, N. Y.

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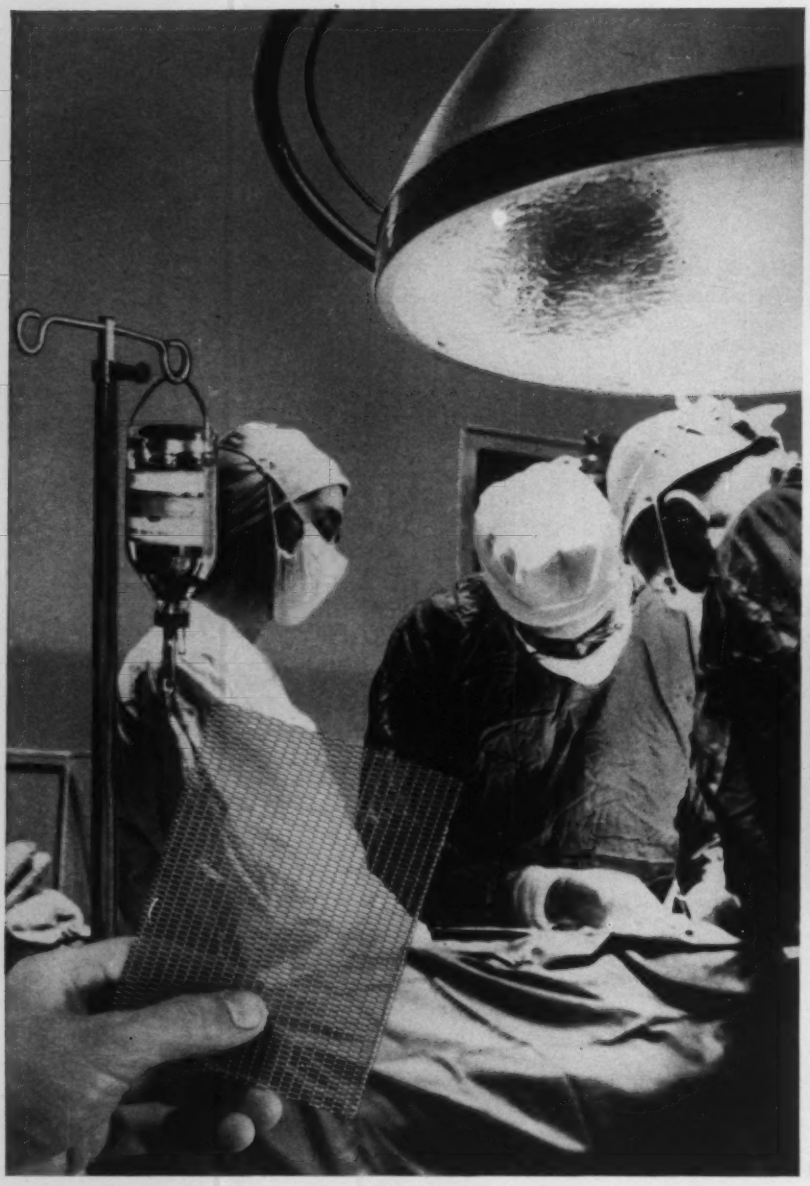

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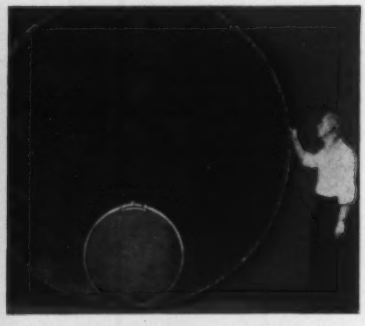

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Small Gains Seen for June

CONTINUED strong demand for steel may cause the nation's producers to pour more ingots this month than they did in May.

There's a good chance that June's production will exceed May's 9 million tons by as much as 5 per cent. But if June steelmaking merely holds at the May pace, it will still top the June, 1960, output by more than 20 per cent.

OPTIMISM HIGH— Enthusiasm for the immediate outlook is highest among mills in the Chicago area. That's not unusual because more steel is consumed there than the mills can produce. Says a top sales official at one big Chicago mill: "Daily bookings are at the highest level in more than a year. June will be better than May; July will be about the same as June, and the remainder of the year looks encouraging." Chicago steelmakers attribute their prosperity to strong automotive buying, plus a seasonal upswing in demand for galvanized sheets and wide flange beams.

BACKLOGS RISING— In other steelmaking centers, producers are less confident that June will be better than May. Most of the business being booked is for quick delivery, they point out, so it's impossible to say what the outcome will be until late in the month. Mill backlogs are small but trending upward. At Jones & Laughlin Steel Corp., unshipped orders are 36 per cent above the mid-February low. At Inland Steel Co., they are 13 per cent higher than they were a month ago but 19 per cent lower than they were in May, 1960.

AFTER JUNE, WHAT?— Although steel production is expected to continue rising during June, most observers think operations are nearing a plateau. Chances are that some steelmakers will cut their production moderately around July 4. Reasons: 1. They'll want to minimize the cost of premium pay for work on the holiday. 2. Many of their customers will be shutting down their plants for vacations.

HIGHER PRICES COMING?— Steel spokesmen interviewed at the annual meeting of the American Iron & Steel Institute in New York were unanimous in lamenting the profit squeeze and in saying that the industry needs higher prices. But none would predict when a move might be made. If market conditions are favorable, there will be strong pressure for an upward adjustment on or about Oct. 1. That's when the United Steelworkers get the third installment of the wage package they negotiated in January, 1960. The industry has absorbed employment cost increases of about 30 cents an hour since the last price increases in 1958.

COMPETITION A DETERRENT— But pressure from imports and nonferrous materials will cause steelmakers to think twice about upping their prices. Competition in the stainless strip market is so keen that prices have been chaotic for months. Last week, a major producer cut its quotations on several grades 3.5 to 5 per cent to meet competition from other sellers who were fighting for automotive trim business.

PRODUCTION HOLDS—Look for ingot production in the week ending June 10 to slightly exceed the 2,080,000 tons that STEEL estimates the industry poured in the week ended June 3. Output then was almost unchanged from the previous week's 2,077,000 tons.

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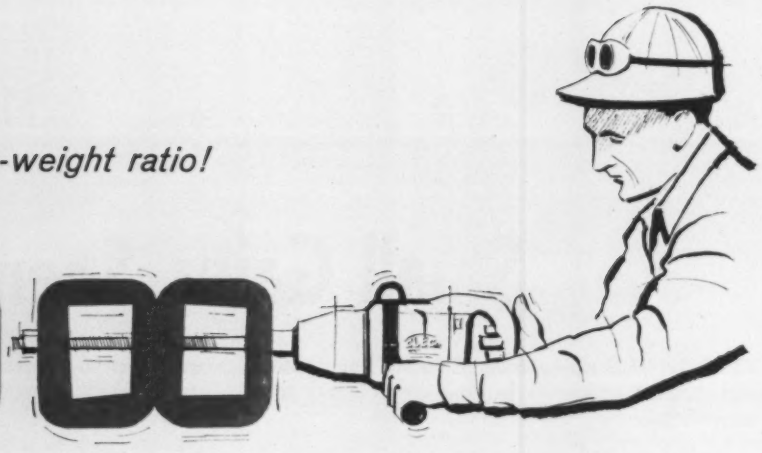

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The Cleco 1¼" bolt-size W-1000 Impact Wrench can be in your shop for a demonstration-tryout soon. Check the yellow pages for the number of your nearest Cleco representative today!

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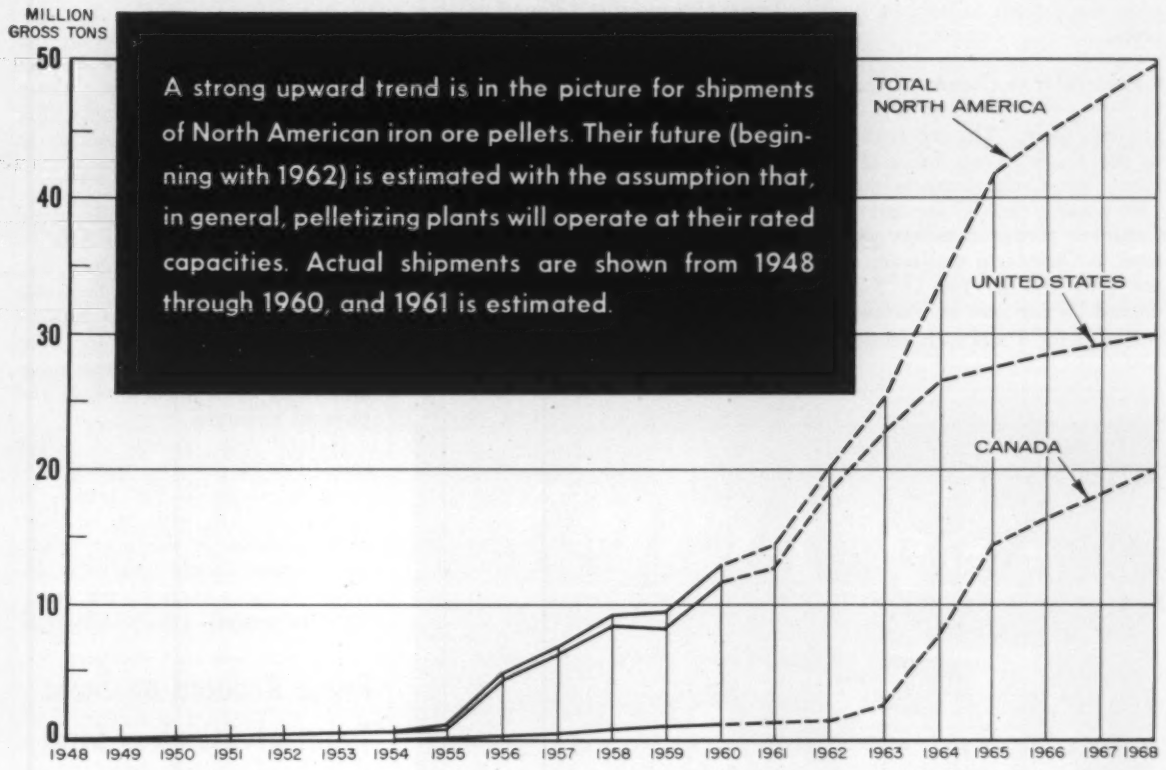

MILLION GROSS TONS
50
40
30
20
10
0
A strong upward trend is in the picture for shipments of North American iron ore pellets. Their future (beginning with 1962) is estimated with the assumption that, in general, pelletizing plants will operate at their rated capacities. Actual shipments are shown from 1948 through 1960, and 1961 is estimated.
TOTAL NORTH AMERICA
UNITED STATES
CANADA
1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968

Source: John J. Craig, vice president, Technical Services Inc., Cleveland

Iron Ore Pellets—A Growth Product

PRODUCTION of iron ore pellets —a basic raw material for the iron and steel industry—will set another record this year in North America, even though iron and steel output won't be close to record.

Furthermore, pellet shipments are likely to set records each year through 1968 (see chart above).

The projections in the chart (made by John J. Craig, vice president, Technical Services Inc., Cleveland) are based on plans for the expansion of pellet production.

• **Outlook for 1961** — Pellet shipments in North America this year are estimated by Mr. Craig at 14,250,000 gross tons.

Plants in this country will supply 12,850,000 tons; Canadian plants, 1,400,000. Last year (also a record setter) saw 11,651,000 tons come from U. S. plants and 1,246,000 from Canadian plants—a North American total of 12,897,000 gross tons.

Iron Ore Pellet Shipments From North American Plants

(Thousands of gross tons)

	U. S.	Canada	Total N. Amer.
1948	1	—	1
1949	3	—	3
1950	82	—	82
1951	217	—	217
1952	163	—	163
1953	499	—	499
1954	663	—	663
1955	868	231	1,099
1956	4,461	375	4,836
1957	6,254	566	6,820
1958	8,452	864	9,316
1959	8,364	1,081	9,445
1960	11,651	1,246	12,897
Totals	41,678	4,363	46,041
1961 Est.	12,850	1,400	14,250

North American pellet production, since its beginning (1000 tons from pilot plants in 1948) is shown in the table at the left. Production from commercial size production plants began making itself evident in 1955.

• **Growing Importance** — Annual production of 50 million gross tons by 1968 (see chart) will comprise around one-third of the iron ore tonnage that is expected that year in North America, Mr. Craig points out. In 1960, pellets constituted about 12 per cent of the total tonnage.

Nearly all the pellets produced in the U. S. are consumed here. Only a small tonnage goes to Canadian furnaces, Mr. Craig notes. He ex-

pects the pattern to hold in future years.

• **Exported from Canada**—Less than half the pellets produced in Canada are used there. The rest is shipped to the U. S. Look for a change here. Mr. Craig estimates that by 1965 possibly only 25 per cent of the Canadian produced pellets will be used in Canada; a minimum of 50 per cent will go the U. S., and around 25 per cent to Europe.

Except for a relatively small tonnage of large sizes (around an inch in diameter) used as open hearth lump ore, all pellets are consumed in blast furnaces in the U. S. and Canada. (The usual size is around ½ in. or a little less.)

Pellets have been winning their way, Mr. Craig explains, by providing these benefits: An increase in the daily iron production per furnace, thus reducing the unit capital charges for a blast furnace plant; decreases in coke and limestone consumption per ton of iron; decreases in slag volume and flue dust per ton of iron; and decreases in the direct operating costs per ton of iron. The use of pellets, Mr. Craig summarizes, results in a substantial increase in pig iron production at reduced cost.

• **Advantages** — Pellets offer three distinct advantages in the production of pig iron, he points out: High iron content and favorable ratio of iron to silica; a physical structure highly suitable for blast furnace utilization; and maximum uniformity in chemical analysis and physical structure.

Natural iron content of pellets runs 61 to 66 per cent, with an average of about 63 per cent. "It is expected that, with the addition of new plants in the near future, the average should gradually increase to more than 64 per cent," Mr. Craig says.

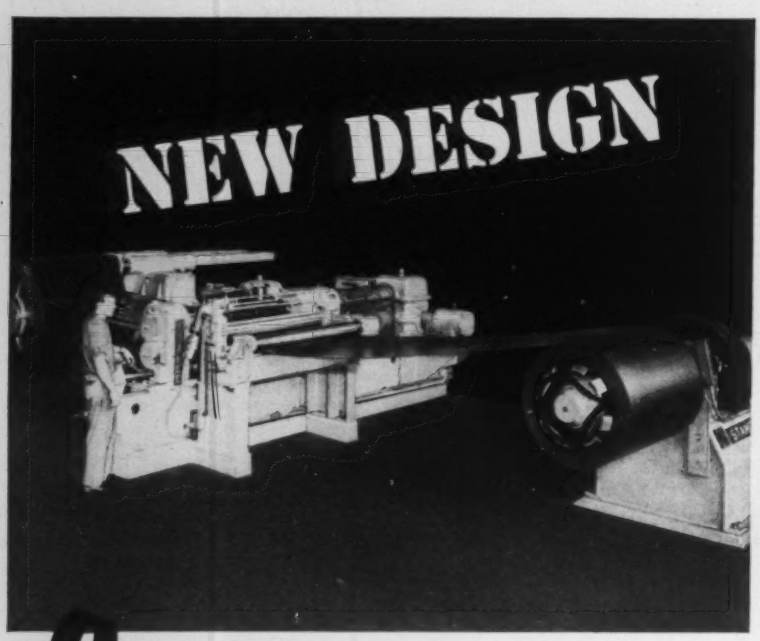
Prices Reduced on Some Types of Stainless Strip

Allegheny Ludlum Steel Corp., Pittsburgh, has reduced base prices 1½ to 4 cents a pound on some stainless steel strip grades, and has made adjustments in extras for both stainless sheet and strip. Action by other producers is expected.

The company also introduced a new stainless steel sheet product that is roller leveled and not resquared. It is available at a lower price than conventional stretcher leveled and resquared material. Present prices for the stretcher leveled and resquared product remain unchanged, but roller leveled stainless is offered with price extras of 1 to 4 cents per pound over the price of stainless steel sheet in coils. The exact price extra is determined by the gage and width of the sheet specified.

The price changes affect the more common grades of cold rolled stainless steel, including such popular types as 201, 202, 301, 302, 304, 316, and 430. Stainless sheet and strip of those types are used in volume in automobiles, appliances, architecture, and many other applications (see prices on page 124).

Allegheny Ludlum, in announcing the prices, said the reductions were made to meet competitive condi-



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Unit will handle coils of 20 thousand pounds maximum weight with a maximum width of 52 inches. Attractively priced. Contact our specialized sales representatives for complete information.

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W. H. Millan, 11955 Shaker Boulevard, Cleveland 20, Ohio

tions which have recently become widespread in the flat rolled stainless industry.

Steel Bars . . .

Bar Prices, Page 120

Although volume is a little better than it was a month ago, demand for carbon bars continues spotty. Mill shipments still range two to four weeks. Cold finished can be had for spot delivery in some instances, but two weeks is nearer the average for delivery. Shipments of alloy bars continue easy.

Barmakers think business may begin to taper off as the vacation season nears. However, sentiment for the long term is optimistic; trade leaders are anticipating better volume for the year than had been predicted earlier.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 121

Some producers of reinforcing steel bars are operating close to capacity. Demand is strong, reflecting the seasonal bulge in construction. The condition is expected to continue into the fall. Deliveries are still prompt, however, averaging around two weeks. In some cases, even quicker shipment is available.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 121 & 122

Light, flat rolled steel is moving steadily to a diversity of consumers, but the mills can make fast deliveries, and some are anxious to book additional tonnage for early shipment. In general, buyers can get deliveries on hot and cold rolled sheets in three to five weeks. Galvanized sheet delivery promises are rather extended; some producers are being booked into August. Sheet specialties can be had on the average in four weeks.

June shipments of one Pittsburgh area producer are expected to equal May's, and while this interest hasn't got a full order book, it has entered enough business for the month to assure fairly high level operations the next several weeks.

Some mills are anticipating a slackening in demand as the vacation season nears. This will probably show up late this month.

Tubular Goods . . .

Tubular Goods Prices, Page 124

Standard pipe demand continues disappointing. Orders are up seasonally, but not as much as had been expected. Competition from imports is partly to blame: Says one Pittsburgh area producer: "If it weren't for imports, I'm sure we would be running full. But we're having a hard time selling against foreign pipe on the coasts.

"We understand about 65 per cent of the pipe being used on the West Coast is of foreign origin, mostly from Japan and Australia. In addition, barges are carrying imported pipe into the interior, landing some as far north as Louisville. With the Seaway open, more pipe is going into the Chicago market."

Wire . . .

Wire Prices, Pages 122 & 123

Stronger demand for manufacturers' wire is reported developing.

ATTENTION STEEL PRODUCERS and FABRICATORS

QUITE A FEW OF YOUR COMPETITORS ARE DESCALING THEIR SHEETS, BILLETS, WIRE AND PIPE AT A LOWER COST THAN YOU ARE... SIMPLY BECAUSE THEY'VE CHANGED TO METAL BLAST's

"SUPER-STEEL"

SHOT and/or GRIT! *

HERE'S WHY THEY CHANGED...

They're paying only $165.00 per ton (truck loads) — considerably less than you are, if you're using competitive steel abrasives. Yet, SUPER-STEEL gives them excellent cleaning, greater resistance to breakdown and lower maintenance costs. Why don't you, too, take advantage of this opportunity to cut costs? We'll rush a trial order, lab test samples, full information or have our sales engineer call.

WRITE, WIRE OR PHONE COLLECT...

METAL BLAST, INC.

874 EAST 67th STREET • CLEVELAND 3, OHIO • Phone EXpress 1-4274

ALSO IN: Chattanooga • Chicago • Cincinnati • Dayton • Detroit • Elberton, Ga. • Grand Rapids • Greensboro, N. C. Houston • Los Angeles • Louisville • Milwaukee • Minneapolis • New York • Philadelphia • Pittsburgh and St. Louis.

* 50 OR 100 lb. BAGS, PALLETIZED IF DESIRED

MANUFACTURERS ALSO OF TOP QUALITY "SEMI-STEEL" SHOT AND GRIT MALLEABLE AND CHILLED SHOT AND GRIT — AT COMPARABLE SAVINGS!

The automotive industry is specifying a little more actively. It has pushed some of its schedules forward. As a result, auto requirements for high carbon wire (particularly for cushions) has been upped 25 to 30 per cent in the last few weeks. Wire for furniture springs, however, shows no change —demand coasting along at about the same level as a month ago.

Demand for mesh is also better. More tonnage will be shipped this month than was moved in May. Production is reported at about two-thirds of capacity and is expected to hold (or improve) into August.

Plates . . .

Plate Prices, Page 120

Sheared carbon plates are moving at a slow pace, but the trend is steady. Relatively, there's still more activity in plate specialties and alloys, due to defensework and chemical industry requirements in particular.

Deliveries of sheared carbon plates range ten days to three weeks, with the inside of the range a little more difficult to obtain.

RA 330® brings the space age **CLOSER**

RA 330 supports rocket cases in pit furnace 10 ft. diameter by 30 ft. deep.

RA 330 provides strength at 1900° F. to support, without fear of dropping, a 3500 pound load; resistance to thermal shock of rapid heating and air quenching; resistance to furnace atmosphere and oxidation.

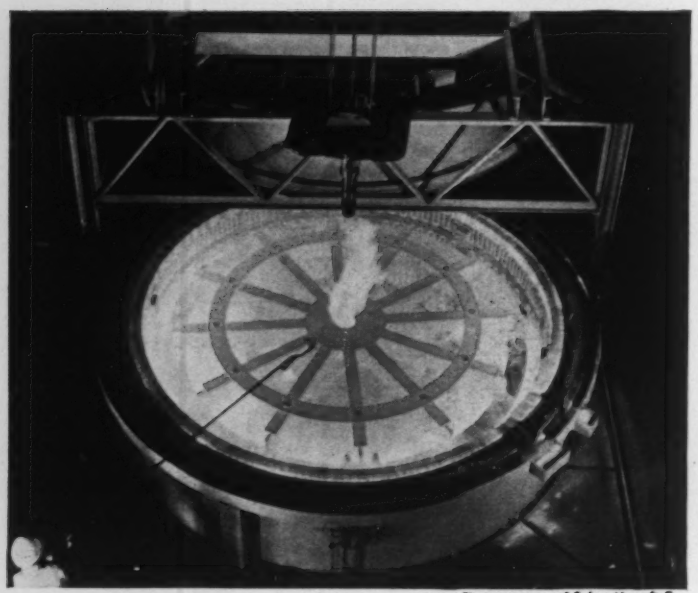


Photo courtesy of Solar Aircraft Co.

Based upon highly successful use of RA 330 in other applications with temperatures ranging up to 2250° F., Solar Aircraft Company selected RA 330 for this critical application.

For best performance specify RA 330 for your heat treating fixtures and furnace parts.

Rolled Alloys Heat Resisting Alloy Specialists will gladly be of service. For technical data—send for Bulletin No. 107.

ROLLED ALLOYS, INC.
Heat and Corrosion Resistant Alloy Specialists
5309 Concord Avenue • Detroit 11, Michigan
330 William Street • South River, New Jersey

Plans are on the boards for a sizable addition to Seattle municipal water system involving a large supply line from the new Tolt River District.

Tin Plate . . .

Tin Plate Prices, Page 122

Demand for tin plate is nearing a seasonal peak, and most producers are operating at capacity. They're solidly booked for June, but some mills have open space in July schedules. Because unseasonably cool weather in much of the country may have retarded beer sales, tin plate producers fear that the can companies won't make as many beer containers in the third quarter as they normally do.

Tool Steel . . .

Tool Steel Prices, Page 124

A reduction in carbide metal prices and a proportional reduction in prices of throwaway inserts and single tools (effective June 1) are shown in a new catalog (TT-61) being issued by Firth Sterling Inc., Pittsburgh.

Prices on some carbide items are reduced as much as 20 per cent in a new Vascoloy-Ramet price list, for use with Catalog VR-58. The new list reduces the maximum catalog quantity value from $500 to $300 of an item.

Distributors . . .

Prices, Page 125

Buying from steel service centers rose slightly from April to May, topping any earlier 1961 month. June business is expected to hold steady in view of pending purchases for maintenance and repairs by metalworking plants during the mass vacation period.

Many distributors are accumulating inventories of galvanized and hot rolled sheets, reflecting the steady lengthening of leadtime required by mills to fill orders on those items.

Structural Shapes . . .

Structural Shape Prices, Page 120

Fairly active demand for structurals continues to be reported. Fabricator's backlogs are becoming more extended, and inquiry is developing in encouraging volume. Public work continues to dominate the

market, but there is a larger and more diversified amount of private construction coming out.

Delivery promises on structurals remain unchanged at two to four weeks, and the betterment in demand hasn't served to stiffen prices to any marked degree. A West Coast fabricator reported being underbid $80,000 on a $300,000 job. However, with shipments promising to exceed earlier estimates, observers are anticipating a firming up in the market before long, especially with strong demand promising to hold through June and beyond.

Fabricated Structural Bookings, Shipments Rise

April bookings and shipments of fabricated structural steel were the highest so far this year, reports the American Institute of Steel Construction. Bookings totaled 309,400 tons, an increase of 5 per cent over the total reported for the preceding month. Shipments amounted to 318,657 tons and were 9 per cent higher than in March, though off slightly from the movement in April, 1960.

The industry's performance in the first four months this year was off somewhat from that in the corresponding period a year ago. Bookings totaled 1,169,967 tons, down 13 per cent, while shipments of 1,132,805 tons were off slightly from the 1,140,306 tons moved in the first four months of 1960.

Order backlogs as of Apr. 30 amounted to 2,377,514 tons. Of that total, 1,310,015 tons (55 per cent) are scheduled for fabrication within the four months ending Aug. 31.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1000 tons, 11 story, national headquarters of the Protestant Episcopal Church, Second Ave. and 43rd St., New York, through George A. Fuller Co., general contractor, to the Bethlehem Steel Co., Bethlehem, Pa.

275 tons, Port of Tacoma elevator addition to Ace Furnace Co., Tacoma; reinforcing to J. D. English Steel Co., Tacoma; Baugh Construction Co., Seattle, general contractor.

155 tons, high bridge, state of Montana, at Bozeman, to Pacific Coast Div., Seattle, Bethlehem Steel Co.

STRUCTURAL STEEL PENDING

1183 tons, state bridgework, Route 287, Sec. 3B, Middlesex County, New Jersey, bids July 6; also, 422 tons of reinforcing steel.

500 tons, office building, Portland, Oreg.; bids in.

330 tons, state bridgework, Route 287, sections 12A and 13A, Morris County, New Jersey, bids July 5; also, 410 tons of reinforcing steel.

300 tons, air traffic control center, Nashua, N. H.; Electronics & Missiles Co. Inc., New York, low on the general contract.

255 tons, unit No. 1, coal conveyor system, Kentucky Power Co., Louisa, Ky.; bids closed May 19.

225 tons, state highway work, FARC 51-37, Essex County, New York; bids closed May 25.

220 tons, two composite wide flange beam bridges, Bridgewater, Vt.; bridgework sublet to W. W. Wyman Co., Greenfield, Mass.

213 tons, state bridgework, FARC 51-34, Erie County, N. Y.; bids closed May 25.

200 tons, transmission towers, Seattle City Light Department; Pacific Coast Div., Seattle, Bethlehem Steel Co., low bidder.

186 tons, two, 1 span and one, 4 span composite wide flange beam bridges, Williston-South Burlington, Vt., Project I-89-3, Contract 1; bids June 9, Montpelier, Vt.; also 85 tons, concrete reinforcing bars and 1500 linear ft, steel piles.

175 tons, four span composite wide flange beam bridge, Interstate Route 89, South Burlington, Vt.; Blow & Cote Inc., and E. O. Morin, Morrisville, Vt., low on general contract.

151 tons, state bridgework (80 tons and 71 tons for two projects in Cambria County, Pennsylvania); bids June 8.

123 tons, state highway work, FARC 51-71, Clinton County, N. Y.; bids closed May 25.

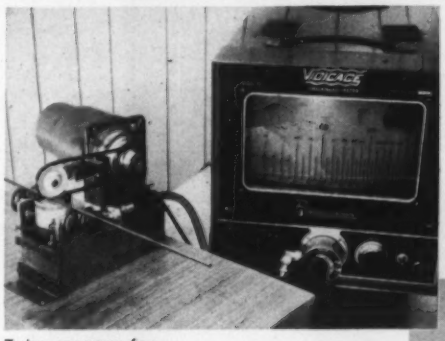
106 tons, state highway work, FARC 61-79, Monroe County, N. Y.; bids closed May 25.

100 tons, two steel towers and facilities, Northway Base, Alaska; Bering Construction Co., Fairbanks, Alaska, is low at $68,630 to the Federal Aviation Service, Anchorage, Alaska.

100 tons or more, Elks Hall, Seattle; Gwinn Construction Co., Seattle, low bidder at $704,732.

ANOTHER ULTRASONIC FIRST...

THICKNESS GAGING WITHOUT CONTACT



Tube scanner for VIDIGAGE® thickness gaging without contact.

Thickness gaging by means of the ultrasonic resonance technique can now be accomplished by immersion without contact. This is extremely advantageous because:

- it eliminates transducer wear
- maintains uniform coupling of energy between transducer and work surface (this in turn makes the test more reliable!)
- avoids possible damage to work surface caused by transducer contact
- substantially increases inspection speeds

When the water column is of sufficient length the VIDIGAGE® does not respond to the water resonances. As a result the resonance thickness of the work piece can be detected by itself on the VIDIGAGE screen.
In order to take full advantage of this immersion system, the VIDIGAGE had to be modified. The modified VIDIGAGE then surpassed all expectations, especially in the gaging of small diameter, high accuracy tubing.

This development is another in the long line of BRANSON engineering breakthroughs, which enables industry to solve its problems by means of ultrasonic testing. The next time you have a testing problem call BRANSON and see how fast BRANSON will find the best solution in the shortest possible time.

SINCE 1946 — THE RESPECTED NAME IN ULTRASONICS

BRANSON INSTRUMENTS, INC.

Ultrasonic Test Division
36 Brown House Road, Stamford, Conn.

ANOTHER NORTON PRODUCT

THIS

. . . is the most important 3/8 of an inch in an abrasive belt . . . the joint

Off-hand grinding needs a belt with one type of joint; flat polishing, another; wide-belt, still another.

Fact is, we supply scores of different types of belt joints, each researched to particular kinds of jobs.

Each must not only be proper, but perfect . . . to avoid bumping, chattering, marking, or premature breakage.

If you're having trouble in these problem areas, rush a call for help. Chances are we can . . . quickly. Call or write Dept. S-6, Behr-Manning Co., Troy, N. Y., a division of Norton Company.

BEAR BRAND Abrasives

100 tons or more, radar towers; Nordin Construction Co., Fairbanks, Alaska, low at $358,165, at Kotzebue, Alaska; Inlet Construction Co., Anchorage, Alaska, low at $229,910, at Unalakleet, Alaska, to U. S. Engineer.

100 tons or more, aircraft repair shop at McChord Air Force Base, Washington; Mowat Bros. Construction Co., Seattle, low at $220,000.

100 tons, municipal control tower, Merrill Field, Anchorage, Alaska; general contract to Alta Construction Co., Anchorage, at $170,529.

100 tons or more, waste treatment plant, Hanford (Wash.) Works; George A. Grant Inc., Richland, Wash., low at $62,390.

100 tons, radar tower, Neah Bay, Washington; general contract to Pacific Coast Construction Co., Lynnwood, Wash., low at $219,335.

REINFORCING BARS . . .

REINFORCING BARS PLACED

510 tons, Seattle University dormitory, to Northwest Steel Rolling Mills Inc., Seattle; Cawdrey & Vemo, Seattle, is general contractor.

360 tons, rehabilitation Shemya Military Base, Alaska; to Pacific Coast Div., Seattle, Bethlehem Steel Co.; general contract to Beck-McLaughlin Co., Seattle, at $3,442,730 by the U. S. Engineer, Seattle.

340 tons, dormitory, state school, Bellingham, Wash., to Northwest Steel Rolling Mills Inc., Seattle; Cawdrey & Vemo, Seattle, general contractor.

300 tons, four story electronics center for General Insurance Co., Seattle; to Pacific Coast Div., Seattle, Bethlehem Steel Co.; Sellen & Hansen, Seattle, general contractors at $857,000.

190 tons, junior high school, East Morrison, Montgomery County, Pennsylvania, to United States Steel Supply Div., Pittsburgh, U. S. Steel Corp.

175 tons, elementary school, Board of Education, Philadelphia, to American Steel Engineering Co., Philadelphia.

140 tons, U. S. Coast Guard facility, Port Clarence, Alaska, to Pacific Coast Div., Seattle, Bethlehem Steel Co.

PLATES . . .

PLATES PLACED

1140 tons, (four contracts) Military Industrial Supply, Navy, Philadelphia, to Caine Steel Co., Philadelphia.

673 tons, hull plates, (two contracts) Military Industrial Supply, Navy, Philadelphia, to Carroll Steel Co. Inc., Woodbury, N. J.; also 521 tons, steel angles.

500 tons, seven miles, 28 in. water supply line, for Aberdeen, Wash.; pipe subcontract to United Concrete Pipe Corp., Auburn, Wash.; Taylor Utilities Construction Co., Seattle, general contractor at $547,000.

235 tons, propane tanks, Bethlehem, Pa., for United Gas Improvement Co., Philadelphia, to Bethlehem Steel Co., Bethlehem.

PLATES PENDING

2000 tons, 14 storage tanks, Paragon Oil Co., Bronx, New York; bids June 1.

1200 tons, 5.7 million gallon water storage tank, Vernon District, Portland, Oreg.; Pittsburgh-Des Moines Steel Co., Seattle, is low at $466,600 on rebids.

500 tons, steel fire wall, Paragon Oil Co., Bronx, New York; bids closed.

253 tons, carbon hull plates (two contracts), Military Industrial Supply Agency, Navy, Philadelphia.

100 tons or more, tank farm total storage 14,500 barrels, St. Paul Island, Alaska; J. W. Perron, Anchorage, low $178,036, to U. S. Fish & Wild Life.

100 tons or more, one, 5000 gallon oil barge; two, 65 ft steel scows; one tugboat; and one, 28 ft steel dredge tender; bids to Suffolk County, New York, Department of Public Works, Yaphank, N. Y.

Unstated tonnage, 150,000 gallon elevated water tank; bid No. 2775, Belmont Filter plant rehabilitation, Philadelphia, June 20.

PIPE . . .

CAST IRON PIPE PLACED

362 tons, 6 and 8 in., for Anchorage, Alaska, to U. S. Pipe & Foundry Co., Seattle.

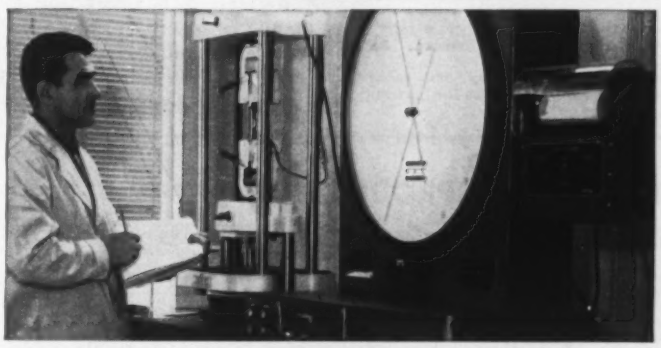
Shipments of Steel Products — March, 1961

(Net tons; all grades)

Products	Carbon	Alloy	Stainless	First Three Months 1961	1960
Ingots, etc.	9,884	9,746	290	52,725	132,796
Blooms, Slabs, etc.	54,987	25,838	2,857	234,329	577,467
Tube Rounds	495	974	.....	3,630	7,054
Skelp	15,298	.....	.....	43,521	57,613
Wire Rods	72,364	1,448	972	191,878	364,421
Structurals	358,563	3,309	4	951,787	1,634,542
Steel Piling	21,967	.....	.....	60,199	120,836
Plates	435,959	38,805	3,230	1,257,474	2,251,573
Rails—Standard	50,045	.....	.....	111,343	259,871
Rails—Other	2,639	1,399	.....	12,902	16,300
Joint Bars	1,637	.....	.....	3,783	8,872
Tie Plates	5,936	.....	.....	16,221	44,127
Track Spikes	3,013	.....	.....	7,132	13,741
Wheels	14,727	61	.....	39,895	77,483
Axles	3,876	14	.....	14,767	40,142
HR Bars	373,677	94,097	3,384	1,309,350	2,603,918
Reinforcing Bars	189,457	.....	.....	471,385	469,513
CF Bars	73,345	12,555	4,833	253,427	514,313
Tool Steel	640	5,888	.....	18,428	29,619
Standard Pipe	167,051	177	.....	443,395	762,420
Oil Country Goods	100,972	17,623	.....	318,858	490,882
Line Pipe	185,571	69	.....	496,332	755,443
Mechanical Tubing	36,381	13,282	243	138,196	282,569
Pressure Tubing	17,986	3,167	1,771	60,135	74,868
Drawn Wire	184,344	2,672	1,908	498,314	790,169
Nails & Staples	30,333	.....	.....	75,703	105,012
Barbed Wire	9,179	.....	.....	18,463	13,161
Woven Fence	17,673	.....	.....	35,149	33,065
Bale Ties, etc.	4,677	.....	.....	9,305	11,499
Black Plate	45,764	.....	.....	127,443	175,346
Tin Plate—HD	27,420	.....	.....	72,229	100,000
Tin Plate—Electro	454,768	.....	.....	1,368,252	1,474,897
HR Sheets	477,103	12,006	1,618	1,423,723	2,849,461
CR Sheets	830,017	3,415	13,712	2,459,607	4,647,926
Galvanized Sheets	249,523	.....	.....	646,621	942,096
Coated Sheets	15,078	.....	.....	47,091	79,974
Elec. Sheets—Strip	1,543	43,839	.....	125,138	206,804
HR Strip	82,033	1,429	245	237,542	470,381
CR Strip	80,342	1,455	11,321	263,009	476,813
Totals (1961)	4,706,267	293,868	46,388	13,918,681	.....
Totals (1960)	7,357,015	551,642	57,224	.....	23,966,987

Data from American Iron & Steel Institute.

Quality Control "Lab" Insures Quality Products!



To continue with Ulbrich's policy of constantly giving customers more and better service Ulbrich has installed a fully equipped laboratory. After conversion of steel stocks to customer requirements, physical properties are checked on such equipment as a Tinius Olsen Tensile Machine, pictured above. Bend Test equipment, Rockwell Testers, a Kentron Micro-Hardness Tester and a complete chemical department supply time saving, accurate analysis and Quality Stainless Steel to *exact* customer specifications.

FOR FAST SERVICE AND DELIVERY
CONTACT YOUR LOCAL STAINLESS STEEL SERVICE CENTER
FOR WEST COAST SERVICE

BRENNER COMPANY
35 No. Raymond Ave., Pasadena, Calif.
MUrray 1-9349 MUrray 1-8322

SPECIAL METALS SUPPLY CO.
175 Demiter St., Palo Alto, Calif.
DA 6-8181

SINCE 1924
Ulbrich
"the biggest little mill in the country"

WRITE, WIRE OR PHONE
ULBRICH STAINLESS STEELS
WALLINGFORD, CONNECTICUT
TWX 277 Phone COlony 9-1434

118 tons, 8 and 12 in., King County District No. 42, to Pacific States Cast Iron Pipe Co., Seattle.

101 tons, 4 to 16 in., Tacoma projects, to Pacific States Cast Iron Pipe Co., Seattle.

CAST IRON PIPE PENDING

362 tons, 6 and 8 in.; bids in to Anchorage, Alaska, U. S. Pipe & Foundry Co., Seattle, low.

362 tons, 6 and 8 in.; bids in at Anchorage, Alaska, May 10.

STEEL PIPE PLACED

110 tons, fabricated pipe, City of Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Reading, ten 900 hp switchers, to Electro-Motive Div., La Grange, Ill., General Motors Corp.

LOCOMOTIVES PENDING

Uruguay, 39 diesel electric locomotives; bids asked.

RAILROAD CARS PLACED

New York Central, fifty-three, 85 ft commuter coaches, to Pullman-Standard Div., Chicago, Pullman Inc.; award of an $8,155,012 contract to build them, the first under a program of partial state loans to the Port of New York Authority, was announced by Gov. Nelson Rockefeller. Under New York State's commuter car program, the railroad and the state share equally in cost of buying new equipment. The state advances its share through the Port Authority, and the railroad repays the money in rental over 25 years. Cars will be delivered over a six month period, beginning in the spring of 1962.

Chicago, Burlington & Quincy, 250, seventy ton insulated boxcars, to the road's own shops at Havelock, Nebr.

Northern Pacific, 350 boxcars, to its own shops at Brainerd, Minn.; work will start in fourth quarter.

Passenger Service Improvement Corp. of Philadelphia, 26, air conditioned, stainless steel passenger cars, bids to be closed July 5. Specifications available through Procurement Dept., City Hall, Philadelphia.

Sandersville, 25, covered hopper cars, to Pullman-Standard Div., Chicago, Pullman Inc.

Central of Georgia, 75 covered hopper cars, to Pullman-Standard Div., Pullman Inc., Chicago.

Norfolk Southern, 75, seventy ton, covered hopper cars, to ACF Industries Inc., Schenectady, N. Y.

Steelmaking Holds Steady During Memorial Day Week

STEELMAKING operations held steady over Memorial Day. Most producers did not curtail basic steel production and restricted operations only in finishing departments. STEEL estimates output for the week ended June 3 at 2,080,000 tons, an increase of only 0.1 per cent from the 2,077,000 tons turned out in the preceding week.

• **Pittsburgh**—Production here held at about 395,500 tons during the week ended June 3. U. S. Steel Corp. and other major producers maintained operations in steelmaking departments over the holiday in anticipation of continued active demand from their rolling departments.

• **Youngstown** — Major mills held operations steady here during the week despite the premium pay Memorial holiday. A year ago, when the holiday fell in a time of weakening demand, steelmakers slashed output to 22 per cent of capacity. The current rate is about 54 per cent of 1960 capacity.

• **Buffalo**—Steel production moved up another notch in the week ended June 3 to about 75.6 per cent of 1960 capacity. Wickwire Spencer Div., Colorado Fuel & Iron Corp., lighted an open hearth furnace while other producers held operations level. Bethlehem Steel Co. may add one or two furnaces soon; the company is operating 24 of 35 open hearths now.

• **Birmingham** — Producers raised operations 1½ points during the week ended June 3 to 68 per cent of 1960 capacity.

• **Detroit** — Mills in this district either maintained operations at the week earlier rate or increased them slightly during the Memorial Day week; none scheduled usual holiday curtailments. A year ago, many major mills across the country closed on Memorial Day and a number were idle for a full week. Decision to maintain operations this year indicates the basic strength in demand.

• **Cincinnati**—Production increased here in the week ended June 3. The area's largest mill reported no change in schedules while another area mill increased production following solution of open hearth operating difficulties.

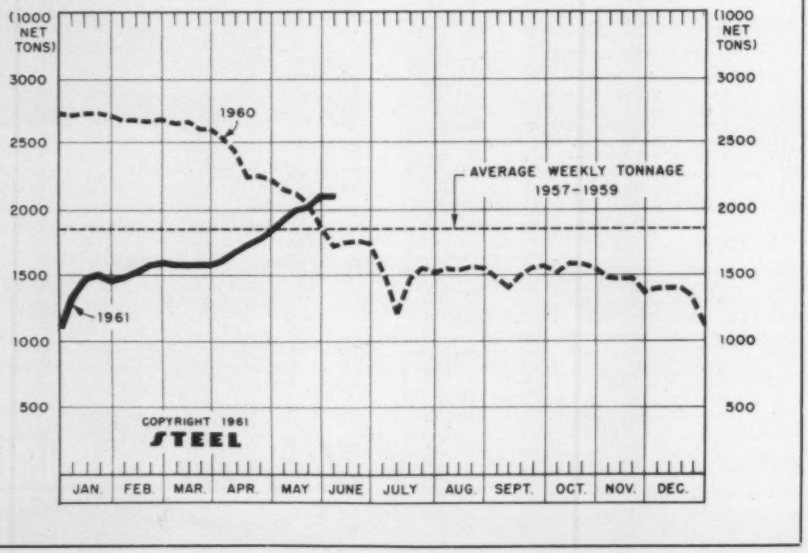
• **Cleveland** — Production held steady during the four week period ended June 3 with output ranging from about 113,000 tons to 114,818 tons.

STEEL INGOT PRODUCTION

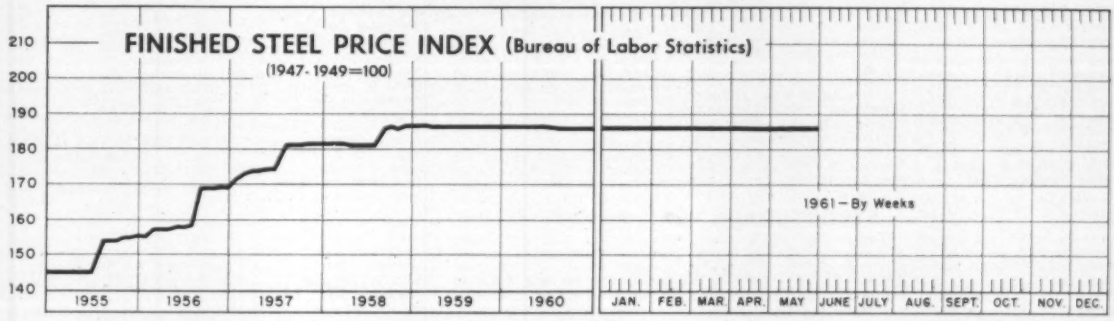
Week Ended	Net Tons	Change
June 3	2,080,000*	+ 0.1%
May 27	2,077,000	+ 2.0%
May 20	2,037,000	+ 2.5%
Totals to May 27		
1961	35,089,000	−32.4%
1960	51,880,000	

DISTRICTS	Week Ended —May 27— Tons‡	Index†	Week Ended May 20 Index†
Northeastern	283,228	106	108
Buffalo	116,826	120	118
Pittsburgh	395,478	98	93
Youngstown	175,080	103	98
Cleveland	112,966	122	123
Detroit	148,982	142	134
Chicago	430,187	115	113
Cincinnati	88,976	118	116
St. Louis	64,637	123	122
Southern	117,068	108	104
Western	141,465	121	128
Industry	2,077,000	111.5	109.3

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



May 30, 1961	Week Ago	Month Ago	May Index	Year Ago
186.0	186.1	186.1	186.1	186.6

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended May 30

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.335
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.225
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.472
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.006
		Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.372
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	May 31 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	210.45
Index in cents per lb	6.713	6.713	6.713	6.713	5.701

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.98
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	60.27
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	59.80
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	61.27
Steelmaking Scrap, GT	37.33	36.33	37.00	32.00	47.17

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	May 31 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.25
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.85

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, ½-⅝" Pitts.	6.40	6.40	6.40	6.40	5.375

PIG IRON, Gross Ton

	May 31 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$61.00
Basic, Valley	66.00	66.00	66.00	66.00	60.00
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	63.76
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	64.26
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	60.50
Malleable, Chicago	66.50	66.50	66.50	66.50	60.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$35.50	$34.50	$34.50	$30.50	$48.50
No. 1 Heavy Melt, E. Pa.	39.00	39.00	40.00	35.00	48.00
No. 1 Heavy Melt, Chicago	37.50	35.50	36.50	30.50	48.00
No. 1 Heavy Melt, Valley	38.50	37.50	36.50	32.50	49.50
No. 1 Heavy Melt, Cleve.	35.50	34.50	33.50	31.50	47.50
No. 1 Heavy Melt, Buffalo	31.50	31.50	31.50	30.50	48.50
Rails, Rerolling, Chicago	57.50	57.50	57.50	52.50	71.50
No. 1 Cast, Chicago	42.50	41.50	42.50	42.50	45.50

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.50

Steel Prices

Mill prices as reported to STEEL, May 31, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 121; footnotes, page 123.

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOT, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rerolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 .....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 .....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14.99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3..121.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14.119.00
S.Duquesne,Pa. U5 ....119.00
Struthers, O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14.122.50
S.Duquesne,Pa. U5 ....122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 .6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 .....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 .....5.60
Lackawanna,N.Y. B2 ...5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 .5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 .....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2 ..5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.90
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14 ..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1 .8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 .....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ...6.50
Weirton,W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ...5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ...6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 .....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1 .5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14 ..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Claymont,Del. P4 .....6.375
Conshohocken,Pa. A3 ...6.375
Ind.Harbor,Ind. I-2 ....6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R22 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ....5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ...5.675
Birmingham(9) C15 ....5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ...6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ...5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ...6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ...6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9) B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2, U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1.6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 .....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14.6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 .....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.65
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Loaded (Including loaded extra) Carbon
LosAngeles P2, S30 ...11.75*

Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12 ..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 .....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 .....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2 R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 .....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 .....7.65

BARS, Cold-Finished Alloy (Turned and Ground)
Cumberland,Md.(5) C19 .6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.25
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 .....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ....9.225

S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.00
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex. (26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1 5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14 5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparowsPoint,Md. B2 .5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 ....7.35
SandSprings,Okla. S5 ..7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ..7.25

BARS, Wrought Iron

Economy,Pa.(B.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5 .20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 .5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H. R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14..7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2 .7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ....7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaClay,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2 .6.275
Steubenville,O. W10 ....6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.425
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif C11	7.875	....
Pittsburgh J5	7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, ENAMELING

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) 9.525

SHEETS, Wall Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland (28) R2 ....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ..6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N5 Nelsen Steel & Wire Co. Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelson Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw&Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.
V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala. City, Ala. (27) R2 ... 5.10
Allenport, Pa. P7 ... 5.10
Alton, Ill. L1 ... 5.30
Ashland, Ky. (8) A10 ... 5.10
Atlanta A11 ... 5.10
Bessemer, Ala. T2 ... 5.10
Birmingham C15 ... 5.10
Conshohocken, Pa. A3 ... 5.15
Detroit M1 ... 5.10
Ecorse, Mich. G5 ... 5.10
Fairfield, Ala. T2 ... 5.10
Farrell, Pa. S3 ... 5.10
Fontana, Calif. K1 ... 5.825
Gary, Ind. U5 ... 5.10
Ind. Harbor, Ind. I-2, Y1 ... 5.10
Johnstown, Pa. (25) B2 ... 5.10
Lackaw'na, N.Y. (25) B2 ... 5.10
LosAngeles (25) B3 ... 5.85
LosAngeles C1 ... 8.60
Minnequa, Colo. C10 ... 6.20
Riverdale, Ill. A1 ... 5.10
SanFrancisco S7 ... 6.60
Seattle (25) B3 ... 6.10
Seattle N14 ... 6.60
Sharon, Pa. S3 ... 5.10
S. Chicago, Ill. W14 ... 5.10
S. SanFrancisco (25) B3 ... 5.85
SparrowsPoint, Md. B2 ... 5.10
Torrance, Calif. C11 ... 5.85
Warren, O. R2 ... 5.10
Weirton, W.Va. W6 ... 5.10
Youngstown U5, Y1 ... 5.10

STRIP, Hot-Rolled Alloy

Carnegie, Pa. S18 ... 8.40
Farrell, Pa. S3 ... 8.40
Gary, Ind. U5 ... 8.40
Houston S5 ... 8.65
Ind. Harbor, Ind. Y1 ... 8.40
KansasCity, Mo. S5 ... 8.65
LosAngeles B3 ... 9.60
Lowellville, O. S3 ... 8.40
Newport, Ky. A2 ... 8.40
Sharon, Pa. A2, S3 ... 8.40
S. Chicago, Ill. W14 ... 8.40
Youngstown U5, Y1 ... 8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland, Ky. A10 ... 7.575
Bessemer, Ala. T2 ... 7.575
Conshohocken, Pa. A3 ... 7.575
Ecorse, Mich. G5 ... 7.575
Fairfield, Ala. T2 ... 7.575
Farrell, Pa. S3 ... 7.575
Gary, Ind. U5 ... 7.575
Ind. Harbor, Ind. I-2, Y1 ... 7.575
Lackawanna, N.Y. B2 ... 7.575
LosAngeles (25) B3 ... 8.325
Seattle (25) B3 ... 8.575
Sharon, Pa. S3 ... 7.575
S. Chicago, Ill. W14 ... 7.575
S. SanFrancisco (25) B3 ... 8.325
SparrowsPoint, Md. B2 ... 7.575
Warren, O. R2 ... 7.575
Weirton, W.Va. W6 ... 7.575
Youngstown U5, Y1 ... 7.575

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10 ... 5.35
Warren, O. R2 ... 5.875

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6 ... 7.425
Baltimore T6 ... 7.425
Boston T6 ... 7.975
Buffalo S40 ... 7.425
Cleveland A7 ... 7.425
Dearborn, Mich. S3 ... 7.425
Detroit D2, M1, P20 ... 7.425
Dover, O. G6 ... 7.425
Evanston, Ill. M22 ... 7.425
Farrell, Pa. S3 ... 7.425
Follansbee, W.Va. W10 ... 7.425
Fontana, Calif. K1 ... 9.20
FranklinPark, Ill. T6 ... 7.425
Ind. Harbor, Ind. Y1 ... 7.425
Indianapolis S41 ... 7.575
LosAngeles C1, S41 ... 9.30
McKeesport, Pa. E10 ... 7.525
NewBedford, Mass. R10 ... 7.875
NewBritain, Conn. S15 ... 7.875
NewCastle, Pa. B4, M23 ... 7.425
NewHaven, Conn. D2 ... 7.875
NewKensington, Pa. A6 ... 7.425
Pawtucket, R.I. R3, N8 ... 7.975
Philadelphia P24 ... 7.875
Riverdale, Ill. A1 ... 7.425
Rome, N.Y. (32) R6 ... 7.425
Sharon, Pa. S3 ... 7.425
Trenton, N.J. (31) R5 ... 8.875
Warren, O. R2, T5 ... 7.425
Worcester, Mass. A7 ... 7.975
Youngstown Y1 ... 7.425
Youngstown S41 ... 7.425

STRIP, Cold-Rolled Alloy

Boston T6 ... 15.90
Carnegie, Pa. S18 ... 15.55
Cleveland A7 ... 15.55
Dover, O. G6 ... 15.55
Farrell, Pa. S3 ... 15.55
FranklinPark, Ill. T6 ... 15.55
Harrison, N.J. S18 ... 15.55
Indianapolis S41 ... 15.70
LosAngeles S41 ... 17.75
Lowellville, O. S3 ... 15.55
Pawtucket, R.I. S8 ... 15.90
Riverdale, Ill. A1 ... 15.55
Sharon, Pa. S3 ... 15.55
Worcester, Mass. A7 ... 15.85
Youngstown S41 ... 15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 ... 10.80
Dearborn, Mich. S3 ... 10.80
Dover, O. G6 ... 10.80
Farrell, Pa. S3 ... 10.80
Ind. Harbor, Ind. Y1 ... 10.80
Sharon, Pa. S3 ... 10.80
Warren, O. R2 ... 10.80
Weirton, W.Va. W6 ... 10.80
Youngstown Y1 ... 10.80

STRIP, Galvanized (Continuous)

Farrell, Pa. S3 ... 7.50
Sharon, Pa. S3 ... 7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson, Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie, Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn, Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover, O. G6	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. M22	9.05	10.40	12.60	15.60	....
Farrell, Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria, O. S1	10.05	10.40	12.60	15.60	....
FranklinPark, Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison, N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain, Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle, Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven, Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington, Pa. A6	8.95	10.40	12.60	15.60	....
New York W3	....	10.70	12.90	16.10	19.30
Pawtucket, R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome, N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon, Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton, N.J. R5	....	10.70	12.90	15.90	18.85
Warren, O. T5	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol, Conn. W1	....	18.85	22.95	27.80
Buffalo W12	....	18.85	....	....
Fostoria, O. S1	....	19.05	22.15	....
FranklinPark, Ill. T6	....	19.20	23.30	28.15
Harrison, N.J. C18	....	18.85	22.95	27.80
NewYork W3	....	18.85	22.95	27.80
Palmer, Mass. W12	....	18.85	....	....
Trenton, N.J. R5	....	18.85	22.95	27.80
Worcester, Mass. A7, T6	....	18.85	22.95	27.80
Youngstown S41	....	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 ... 7.425*
Dover, O. G6 ... 7.425*
Evanston, Ill. M22 ... 7.525*
McKeesport, Pa. E10 ... 7.50*
NewCastle, Pa. M23 ... 7.425*
Riverdale, Ill. A1 ... 7.525*
Warren, O. B9, S3, T5 ... 7.425*
Worcester, Mass. A7 ... 7.975
Youngstown S41 ... 7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2 ... 8.175

TIGHT COOPERAGE HOOP

Atlanta A11 ... 5.825
Farrell, Pa. S3 ... 5.525
Riverdale, Ill. A1 ... 5.675
Sharon, Pa. S3 ... 5.525
Youngstown U5 ... 5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa, Pa. J5	$9.10	$9.35	$9.75
Fairfield, Ala. T2	9.10	9.35	9.75
Fairless, Pa. U5	9.10	9.35	9.75
Fontana, Calif. K1	9.75	10.00	10.40
Gary, Ind. U5	9.10	9.35	9.75
GraniteCity, Ill. G4	9.20	9.45	9.85
IndianaHarbor, Ind. I-2, Y1	9.10	9.35	9.75
Irvin, Pa. U5	9.10	9.35	9.75
Niles, O. R2	9.10	9.35	9.75
Pittsburg, Calif. C11	9.75	10.00	10.40
SparrowsPoint, Md. B2	9.10	9.35	9.75
Weirton, W.Va. W6	9.10	9.35	9.75
Yorkville, O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa, Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor, Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles, O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield, Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless, Pa. U5	6.10	6.25	6.40	6.55
Gary, Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor, Ind. I-2	6.10	6.25	6.40	6.55
Irvin, Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint, Md. B2	6.10	6.25	6.40	6.55
Weirton, W.Va. W6	6.10	6.25	6.40	6.55

Tin Plate, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa, Pa. J5	$10.40	$10.65
Fairfield, Ala. T2	10.40	10.65
Fairless, Pa. U5	10.40	10.65
Fontana, Calif. K1	11.05	11.30
Gary, Ind. U5	10.40	10.65
Irvin, Pa. U5	10.40	10.65
Pitts., Calif. C11	11.05	11.30
Sp. Pt., Md. B2	10.40	10.65
Weirton, W.Va. W6	10.40	10.65
Yorkville, O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa, Pa. J5	$8.20
Fairfield, Ala. T2	8.20
Fairless, Pa. U5	8.20
Fontana, Calif. K1	8.85
Gary, Ind. U5	8.20
GraniteCity, Ill. G4	8.30
Ind. Harbor, Ind. I-2, Y1	8.20
Irvin, Pa. U5	8.20
Niles, O. R2	8.20
Pittsburg, Calif. C11	8.85
SparrowsPoint, Md. B2	8.20
Weirton, W.Va. W6	8.20
Yorkville, O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa, Pa. J5	7.85
Gary, Ind. U5	7.85
GraniteCity, Ill. G4	7.95
Ind. Harbor, Ind. Y1	7.85
Irvin, Pa. U5	7.85
Yorkville, O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom, W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge, Pa. A4	....	....	12.40	13.55	14.65
GraniteCity, Ill. G4	9.975*11.30*		12.00*	13.15*	....
IndianaHarbor, Ind. I-2	9.875*11.20*		11.90*	13.05*	....
Mansfield, O. E6	9.875*11.70		12.40	13.55	14.65
Newport, Ky. A2	9.875 11.70*		12.40*	13.55*	14.65*
Niles, O. M21	9.875*11.70		12.40	13.55	....
Vandergrift, Pa. U5	9.875*11.70		12.40	13.55	14.65
Warren, O. R2	9.875*11.70		12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield, O. E6	8.10
Vandergrift, Pa. U5	8.10
Warren, O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom, W.Va. W10	15.70	16.30	16.80	17.85
Zanesville, O. A10	15.70	16.30	16.80	17.85
Vandergrift, Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler, Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift, Pa. U5	..	17.10	18.10	19.70	20.20	20.70	15.70
Warren, O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity, Ala. R2 ... 8.00
Aliquippa, Pa. J5 ... 8.00
Alton, Ill. L1 ... 8.20
Atlanta A1 ... 8.00
Bartonville, Ill. K4 ... 8.10
Buffalo W12 ... 8.00
Chicago W13 ... 8.00
Cleveland A7, C20 ... 8.00
Crawfordsville, Ind. M8 .. 8.10
Donora, Pa. A7 ... 8.00
Duluth A7 ... 8.00
Fairfield, Ala. T2 ... 8.00
Fostoria, O. (24) S1 ... 8.10
Houston S5 ... 8.25
Jacksonville, Fla. M8 ... 8.35
Johnstown, Pa. B2 ... 8.00
Joliet, Ill. A7 ... 8.00
KansasCity, Mo. S5 ... 8.25
Kokomo, Ind. C16 ... 8.10
LosAngeles B3 ... 8.95
Minnequa, Colo. C10 ... 8.25
Monessen, Pa. P7, P16 .. 8.00
Palmer, Mass. W12 ... 8.30
Pittsburg, Calif. C11 ... 8.95
Portsmouth, O. P12 ... 8.00
S. Chicago, Ill. R2 ... 8.00
S. SanFrancisco C10 ... 8.95
SparrowsPoint, Md. B2 .. 8.10
Sterling, Ill. (1) N15 ... 8.00
Sterling, Ill. N15 ... 8.10
Struthers, O. Y1 ... 8.00
Waukegan, Ill. A7 ... 8.00
Worcester, Mass. A7 ... 8.30

WIRE, Cold Heading Carbon

Elyria, O. W8 ... 8.00

WIRE, Gal'd., for ACSR

Bartonville, Ill. K4 ... 12.65
Buffalo W12 ... 13.40
Cleveland A7 ... 12.65
Donora, Pa. A7 ... 12.65
Duluth A7 ... 12.65
Johnstown, Pa. (10) B2 .. 12.65
KansasCity, Mo. U3 ... 12.90
LosAngeles (2) B3 ... 13.60
Minnequa, Colo. C10 .. 12.775
Monessen, Pa. P7, P16 .. 12.65
Muncie, Ind. I-7 ... 13.60
NewHaven, Conn. A7 .. 12.95
Palmer, Mass. W12 ... 13.70
Pittsburg, Calif. C11 ... 13.45
Portsmouth, O. P12 ... 12.65
Roebling, N.J. R5 ... 12.95
SparrowsPt., Md. (10) B2 12.75
Struthers, O. Y1 ... 13.40
Trenton, N.J. A7 ... 12.95
Waukegan, Ill. A7 ... 12.65
Worcester, Mass. A7 ... 12.95

WIRE, Upholstery Spring

Aliquippa, Pa. J5 ... 9.75
Alton, Ill. L1 ... 9.95
Buffalo W12 ... 9.75
Cleveland A7 ... 9.75
Donora, Pa. A7 ... 9.75
Duluth A7 ... 9.75
Johnstown, Pa. B2 ... 9.75
KansasCity, Mo. S5, U3 .. 10.00
Kokomo, Ind. C16 ... 9.85
LosAngeles B3 ... 10.70
Minnequa, Colo. C10 ... 9.95
Monessen, Pa. P7, P16 .. 9.75
NewHaven, Conn. A7 ... 10.95
Palmer, Mass. W12 ... 10.05
Pittsburg, Calif. C11 .. 10.075
Portsmouth, O. P12 ... 9.75
Roebling, N.J. R5 ... 10.05
S. Chicago, Ill. R2 ... 9.75
S. SanFrancisco C10 .. 10.70
SparrowsPt., Md. B2 ... 9.85
Struthers, O. Y1 ... 9.75
Trenton, N.J. A7 ... 10.05
Waukegan, Ill. A7 ... 9.75
Worcester, Mass. A7 .. 10.05

WIRE, MB Spring, High-Carbon

Aliquippa, Pa. J5 ... 9.75
Alton, Ill. L1 ... 9.95
Bartonville, Ill. K4 ... 9.85
Buffalo W12 ... 9.75
Cleveland A7 ... 9.75
Donora, Pa. A7 ... 9.75
Duluth A7 ... 9.75
Fostoria, O. S1 ... 9.80
Johnstown, Pa. B2 ... 9.75
KansasCity, Mo. S5, U3 .. 10.00
LosAngeles B3 ... 10.70
Milbury, Mass. (12) N6 .. 10.05
Minnequa, Colo. C10 ... 9.95
Monessen, Pa. P7, P16 .. 9.75
Muncie, Ind. I-7 ... 9.95
Palmer, Mass. W12 ... 10.05
Pittsburg, Calif. C11 ... 10.70
Portsmouth, O. P12 ... 9.75
Roebling, N.J. R5 ... 10.05
S. Chicago, Ill. R2 ... 9.75
S. SanFrancisco C10 ... 10.70
SparrowsPt., Md. B2 ... 9.85
Struthers, O. Y1 ... 9.75
Trenton, N.J. A7 ... 10.05
Waukegan, Ill. A7 ... 9.75
Wor'ster, Mass. A7, J4, T6 10.05

WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1 ... 16.50
Bartonville, Ill. K4 ... 16.40
Chicago W13 ... 16.30
Cleveland A7 ... 16.30
Crawfordsville, Ind. M8 .. 16.40
Fostoria, O. S1 ... 16.30
Houston S5 ... 16.55
Jacksonville, Fla. M8 .. 16.65
Johnstown, Pa. B2 ... 16.30
KansasCity, Mo. S5 ... 16.55
Kokomo, Ind. C16 ... 16.30
Minnequa, Colo. C16 ... 16.55
Monessen, Pa. P16 ... 16.30
Muncie, Ind. I-7 ... 16.50
Palmer, Mass. W12 ... 16.60
S. SanFrancisco C10 ... 17.15
Waukegan, Ill. A7 ... 16.30
Worcester, Mass. A7, J6 .. 16.60

ROPE WIRE (A)

Bartonville, Ill. K4 ... 13.45
Buffalo W12 ... 13.45
Fostoria, O. S41 ... 13.45
Johnstown, Pa. B2 ... 13.45
Monessen, Pa. P7 ... 13.45
Muncie, Ind. I-7 ... 13.65
Palmer, Mass. W12 ... 13.75
Portsmouth, O. P12 ... 13.45
Roebling, N.J. R5 ... 13.75
St. Louis L8 ... 13.45
SparrowsPt., Md. B2 ... 13.55
Struthers, O. Y1 ... 13.45
Worcester, Mass. J4 ... 13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes — Col.

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S. Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.)(per 97 lb net box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	9.02
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	9.02
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	8.02
Pittsburg,Calif. C11	9.20
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	9.30
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	9.30
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.50
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	9.35
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	9.35
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.55
S. Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — Col.

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198§
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	19.10	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WOVEN FENCE, 9-15 Ga. — Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality

6 to 8 gage	**An'ld Galv.**
Ala.City,Ala. R2	9.00 9.55**
Aliquippa J5	8.65 9.32§§
Atlanta(48) A11	9.00 9.75*
Bartonville(48) K4	9.85 19.90
Buffalo W12	9.00 9.55†
Chicago W13	9.00 9.55**
Cleveland A7	9.00 ....
Crawfordsville M8	9.10 9.80††
Donora, Pa. A7	9.00 9.55†
Duluth A7	9.00 9.55†
Fairfield T2	9.00 9.55
Houston(48) S5	9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.67§§
Joliet,Ill. A7	9.00 9.55†
KansasCity(48)S5	9.25 9.80**
Kokomo(48) S16	9.10 9.65†
LosAngeles B3	9.95 10.62§§
Minnequa C10	9.25 9.80**
Monessen(48) P7	8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	9.00 9.55†
S.Chicago R2	9.00 9.55**
S.SanFran. C10	9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(37)(48)N15	9.10 9.80
Struthers,O. Y1	9.00 9.65‡
Worcester,Mass.A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent: heavy hex nuts 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent.)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Hot Galvanized and Zinc Plated:

Packaged	39.25
Bulk	46

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
*Bulk	46

*Hot galvanized or zinc plated lag bolts only—for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packaged	+ 5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packaged	+29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
Bulk	46

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.28
2½	12	49.24	57.72	43.70
2¾	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Standard All No. 2	Toe Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....(16)	6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 3 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in., and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.76
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Prooducts; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: Carbon Base 5%	10%	15%	20%	Sheets: Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
*Copper**	*36.60*	*43.85*

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
12.25	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3 J1	78.00
Port Colborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12¼ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS				PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	STRUCTURAL SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.20	9.61	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	10.41	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	11.10	11.77	12.40	10.05	13.35	16.69	10.50	9.85	11.85
Buffalo	8.55	9.30	11.25	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.70	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.34	10.26	10.75	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	10.57	10.05	11.75	12.13	9.98	12.98	16.95	10.21	9.81	11.18
Detroit	9.48	10.46	11.05	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	10.17	9.65	11.35	11.73	9.58	13.10	16.55	9.81	9.41	10.78
Indianapolis	9.66	10.64	11.14	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.84	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.62	10.60	11.10	11.79	9.62	11.05	16.40	9.97	9.46	11.75
Newark, N. J.	9.36	10.13	11.35	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	11.46	9.74	13.25	16.40	10.20	9.51	11.00
Philadelphia	9.50	10.00	10.89	11.25	9.65	11.95	16.48	9.85	8.85	11.10
Pittsburgh	9.22	10.53	11.58	11.49	9.22	11.25	16.95	8.91	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	11.08	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	9.57	10.24	11.39	11.74	9.57	11.49	16.54	9.92	9.41	11.70
San Francisco	10.17	11.69	11.95	11.78	10.07	15.10	18.20	10.49	10.38	12.47
Seattle	11.35	12.45	13.40	12.80	10.80	10.20	17.80	11.59	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.01

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ¼ in. x 1 in.; hot rolled carbon cars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars,, 4140 annealed, 1⅝ in.—2⅝ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ⅛ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo.; Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $200; Stevens Pottery, Ga., $210.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $385.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$15.50-16.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$3.00-3.50
60-65%	3.60-4.00

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Inches Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Brands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe.	36.75, ton deld. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.00
Bronze powder, 90/10.	54.10
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types	0.78-1.06
Nickel-Silver	58.50
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens	
Connellsville, Pa. furnace	$14.75-15.25
Connellsville, Pa. foundry	18.00-18.50
Oven Foundry	
Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.60	$5.65	$5.55	$5.45	$5.75
Bar Size Angles	5.85	5.90	5.80	5.70	6.00
Structural Angles	5.65	5.70	5.60	5.50	5.80
I-Beams	5.60	5.65	5.55	5.45	5.75
Channels	5.60	5.65	5.55	5.45	5.75
Plates (basic bessemer)	5.55	5.60	5.50	5.40	5.70
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	23.90	23.95	23.85	23.55	25.30
Barbed Wire (†)	6.20	6.15	6.05	5.90	6.25
Merchant Bars	6.15	6.20	6.10	6.00	6.30
Hot-Rolled Bands	5.95	6.00	5.90	5.80	6.10
Wire Rods, Thomas No. 5 (Niederrhein)	5.80*	5.90	5.75	5.75	6.00
Wire Rods, O.H., No. 5 (Niederrhein)	6.00*	6.10	5.95	5.95	6.20
Bright Common Wire Nails (§)	7.15	7.20	7.10	7.00	7.30

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier. *Except Boston.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot of 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.27, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5-7%, Si 4-6%, S 0.03% max, 20.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max., Si 1.0% max., S 0.03%, 21.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome: (Simplex) Cr 63-66% or 68-71%: C 0.025% max., 31.50c; C 0.010% max., 32.50c per lb of contatined Cr, carlots, lump, bulk, delivered.

Cr 68-73%: C 0.25% max., 33.00c. Cr 65-71%; C 0.05% max., 32.00c; C 0.10% max., 31.75c; C 0.20% max., 31.50c; C 0.50% max, 31.25c; C 1.0% max., 31.00c; C 1.5%, 30.75c; C 2.0% max, 30.50c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C. l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy, carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 22.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 22.50c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

33-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $5.25 per lb (all quantities) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.65 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-70%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

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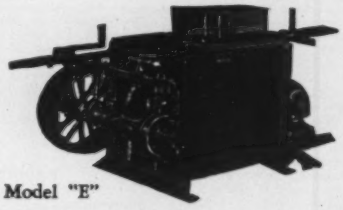

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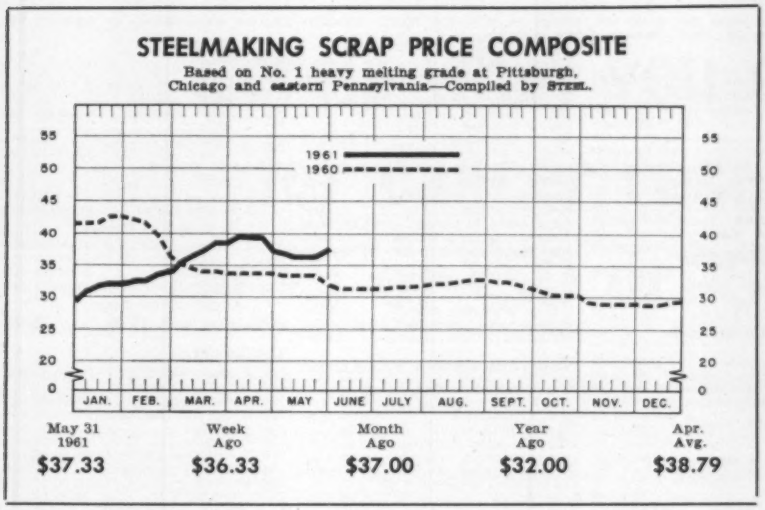

New Strength Developing in Scrap

STEEL's composite on No. 1 heavy melting grade turns upward after holding unchanged for three weeks. Sentiment bolstered by strong steel operations

Scrap Prices, Page 130

• **Chicago** — Leading steelmaking grades of scrap moved up $2 a ton here with the announcement of successful bids for 19,500 tons of No. 1 factory bundles to be produced by district auto stamping plants in June. Bids were up $2.50 over those a month ago, ranging from $39.40 to $39.88, on track. This is the first noticeable firming up in the market in several weeks.

• **Philadelphia** — Domestic scrap prices are unchanged throughout the list. Export demand is the principal firming influence. Recent export buying by a Japanese independent group involves about 180,000 tons of steel scrap for shipment from the U. S. and Canada during June and July. The Japanese cartel, which buys in heavier quantities and on a quarterly basis, is expected to close shortly on third quarter requirements.

• **Pittsburgh**—Brokers' bids on the June list of No. 1 factory bundles from the local GM Fisher Body Div. were up about $2 a ton from last month's offers. Trade sources think the next purchase of No. 1 heavy melting by brokers for a mill on the fringe of the district will be at a price equivalent to $36 or $37 a ton, delivered, Pittsburgh. The higher price may be paid if a substantial quantity is wanted.

• **New York** — Brokers' buying prices are unchanged for the third straight week. Steadiness is ascribed primarily to export buying, as domestic requirements remain light. Prices on turnings are purely nominal, with business in those grades at a virtual standstill.

• **Cleveland**—Prices are up about $1 a ton on the leading steelmaking grades, reflecting higher bids on the automotive lists and better buying by Valley mills. Market sentiment is better, being buoyed by the prospects of higher steelmaking operations over the summer months (with attending heavy scrap use) than had been expected earlier this year.

• **Buffalo**—The Lackawanna, N. Y., plant of Bethlehem Steel Co. has received its first of the season lake shipment of scrap from the Detroit area. Most of the scrap iron movement in this area since the opening of lake navigation has been away from Buffalo, via the St. Lawrence Seaway for export.

The market continues to display

(*Please turn to Page* 135)

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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, May 31, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

May 31	$37.33
May 24	36.33
Apr. Avg.	38.79
May 1960	33.07
May 1956	50.34

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*35.00-36.00*
No. 2 heavy melting	*29.00-30.00*
No. 1 dealer bundles	*36.00-37.00*
No. 2 bundles	24.00-25.00
No. 1 busheling	*35.00-36.00*
No. 1 factory bundles	*43.00-44.00*
Machine shop turnings	13.00-14.00
Mixed borings, turnings	13.00-14.00
Short turnings	16.00-17.00
Cast iron borings	15.00-16.00
Cut structurals:	
2 ft and under	38.00-39.00
3 ft and under	37.00-38.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	41.00-42.00
Electric furnace bundles	*43.00-44.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	35.00-36.00
Stove plate	35.00-36.00
Unstripped motor blocks	25.00-26.00
Clean auto cast	35.00-36.00
Drop broken machinery	45.00-46.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	51.00-52.00
Random rails	46.00-47.00
Angles, splice bars	45.00-46.00
Railroad specialties	41.00-42.00
Rails, rerolling	57.00-58.00

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	*38.00-39.00*
No. 1 hvy melt., dealer	*36.00-37.00*
No. 2 hvy melting	*29.00-30.00*
No. 1 factory bundles	*42.00-43.00*
No. 1 dealer bundles	*39.00-40.00*
No. 2 bundles	*23.00-24.00*
No. 1 busheling, indus.	*38.00-39.00*
No. 1 busheling, dealer	*36.00-37.00*
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	*43.00-44.00*
Punchings & plate scrap	*44.00-45.00*

Cast Iron Grades

No. 1 cupola	*42.00-43.00*
Stove plate	36.00-37.00
Unstripped motor blocks	33.00-34.00
Clean auto cast	46.00-47.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	*41.00-42.00*
R.R. malleable	46.00-47.00
Rails, 2 ft and under	48.00-49.00
Rails, 18 in. and under	49.00-50.00
Angles, splice bars	*44.00-45.00*
Axles	57.00-58.00
Rails, rerolling	*57.00-58.00*

Stainless Steel Scrap

18-8 bundles, solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	38.00-39.00
No. 1 machinery	45.00-46.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Rails, rerolling	61.00-62.00
Railroad specialties	41.00-42.00

CLEVELAND

No. 1 heavy melting	*35.00-36.00*
No. 2 heavy melting	24.00-25.00†
No. 1 factory bundles	*39.00-40.00*
No. 1 bundles	*35.00-36.00*
No. 2 bundles	23.00-24.00†
No. 1 busheling	*35.00-36.00*
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	30.00-33.00
Cut structurals, plate, 2 ft and under	*39.00-40.00*
Low phos, punchings & plate	*37.00-38.00*
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	*37.00-38.00*

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	*47.00-48.00*
Burnt cast	32.00-33.00
Drop broken machinery	*48.00-49.00*

Railroad Scrap

R.R. malleable	47.00-48.00
Rails, 2 ft and under	*48.00-49.00*
Rails, random lengths	44.00-45.00
Rails, 18 in. and under	*49.00-50.00*
Cast steel	39.00-40.00
No. 1 railroad cast	48.00-49.00
Railroad specialties	41.00-42.00
Angles, splice bars	*46.00-47.00*
Rails, rerolling	53.00-54.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	*95.00-100.00*
430 clips, bundles, solids	*75.00-80.00*
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	*38.00-39.00*
No. 2 heavy melting	25.00-26.00†
No. 1 busheling	*38.00-39.00*
No. 1 bundles	*39.00-40.00*
No. 2 bundles	25.00-26.00†
Machine shop turnings	14.00-15.00†
Shovel turnings	19.00-20.00†
Cast iron borings	19.00-20.00†
Low phos.	*40.00-41.00*
Electric furnace bundles	*40.00-41.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*39.00-40.00*

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	27.50-28.50
No. 1 bundles	31.00-32.00
No. 2 bundles	19.00-20.00
No. 1 busheling	30.00-31.00
Machine shop turnings	9.00-10.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	38.00-39.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18 in. and under	46.00-47.00
Rails, random lengths	40.00-41.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	34.00
No. 2 heavy melting	28.00
No. 1 bundles	34.00
No. 2 bundles	24.00
No. 1 busheling	34.00
Machine shop turnings	13.00
Shovel turnings	16.00

Cast Iron Grades

No. 1 cupola	38.00
Charging box cast	34.00
Heavy breakable cast	32.00
Unstripped motor blocks	34.00
Clean auto cast	38.00
Stove plate	33.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00
Rails, random lengths	37.00
Rails, rerolling	52.00-53.00
Rails, 18 in. and under	43.00
Angles, splice bars	40.00†

PHILADELPHIA

No. 1 heavy melting	38.00-40.00
No. 2 heavy melting	34.00-35.00
No. 1 bundles	42.00
No. 2 bundles	25.00
No. 1 busheling	41.00-42.00
Electric furnace bundles	43.00
Mixed borings, turnings	17.00†
Shovel turnings	20.00
Machine shop turnings	14.00
Heavy turnings	25.00†
Structurals & plates	43.00-44.00
Couplers, springs, wheels	43.00
Rail crops, 2 ft & under	52.00-54.00

Cast Iron Grades

No. 1 cupola	40.00
Heavy breakable cast	40.00
Drop broken machinery	49.00-50.00†
Malleable	49.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	5.50-6.00†
Mixed borings, turnings	6.00-6.50†
Shovel turnings	7.00-8.00†
Low phos. structurals & plates	32.00-33.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	*29.00-30.00*
No. 2 heavy melting	*23.00-24.00*
No. 1 bundles	*32.00-33.00*
No. 2 bundles	*21.00-22.00*
No. 1 busheling	*29.00-30.00*
Machine shop turnings	8.00-9.00
Mixed borings, turnings	9.00-10.00
Shovel turnings	10.00-11.00

Cast Iron Grades

No. 1 cupola	31.00-32.00
Mixed cast	29.00-30.00
Stove plate	*27.00-28.00*
Heavy breakable	*26.00-27.00*
Unstripped motor blocks	22.00-23.00
Clean auto cast	*38.00-39.00*

Stainless Steel Scrap

18-8 bundles & solids	165.00-170.00
18-8 turnings	65.00-70.00
430 bundles & solids	65.00-70.00
430 turnings	15.00-20.00†

BIRMINGHAM

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	27.00-28.00
No. 1 bundles	32.00-33.00
No. 2 bundles	19.00-20.00
No. 1 busheling	32.00-33.00
Cast iron borings	10.00-11.00
Machine shop turnings	18.00-19.00
Shovel turnings	21.00-22.00
Bar crops and plates	43.00-44.00
Structurals & plate	42.00-43.00
Electric furnace bundles	36.00-37.00
Electric furnace:	
3 ft and under	34.00-35.00
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	42.00-43.00
Unstripped motor blocks	31.00-32.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00-35.00*
Rails, 2 ft and under	*46.00-47.00*
Rails, random lengths	40.50-41.50
Angles, splice bars	42.00-43.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	35.00
No. 2 heavy melting	31.00-32.00
No. 1 bundles	34.00-35.00
No. 2 bundles	24.00
Machine shop turnings	11.00-12.00
Low phos. plate & structurals:	
3 ft	40.00
2 ft and under	44.00-45.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Heavy breakable	26.00-27.00
Foundry malleable	30.00-31.00
Unstripped motor blocks	31.00-32.00

Railroad Scrap

R.R. heavy melt. (3 ft)	43.00

LOS ANGELES

No. 1 heavy melting	38.00-40.00
No. 1 hvy melt (export)	40.00-42.00
No. 2 heavy melting	34.00-37.00
No. 2 hvy melt (export)	37.00-39.00
No. 1 bundles	*39.00*
No. 2 bundles	25.00
No. 2 bundles (export)	27.00-28.00
Machine shop turnings	15.00-17.00
Shovel turnings	15.00-17.00
Cast iron borings	16.00-17.00
Cut structurals and plate 1 ft and under	*50.00-52.00*

Cast Iron Grades

No. 1 cupola	44.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	42.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	*41.00-42.00*
No. 2 heavy melting	*38.00*
No. 2 bundles	*27.00*
Shovel turnings	16.00-18.00
Electric furnace	*46.00*

Cast Iron Grades

No. 1 cupola	40.00-42.00
Heavy breakable	37.00
Unstripped motor blocks	*36.00*
Stove plate (f.o.b. plant)	37.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	*41.00*
No. 1 hvy (unprepared)	*36.00*
No. 2 heavy melting	*38.00*
No. 2 hvy (unprepared)	*33.00*
No. 2 bundles	*27.00*
Shovel turnings	16.00
Electric furnace	*46.00*

Cast Iron Grades

No. 1 cupola	44.00
Heavy breakable cast	39.00
Stove plate (f.o.b. plant)	37.00
Unstripped motor blocks	*36.00*

SAN FRANCISCO

No. 1 heavy melting	41.00**
No. 2 heavy melting	38.00**
No. 1 bundles	34.00**
No. 2 bundles	27.00**
Machine shop turnings	18.00**
Mixed borings, turnings	18.00**
Cast iron borings	18.00**
Heavy turnings	18.00**
Shovel turnings	18.00**
Cut structurals, 3 ft	44.00

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Broker's buying prices; net tons)

No. 1 heavy melting	31.00
No. 2 hvy melt, 2 ft & under	29.00
No. 1 bundles	31.00
No. 2 bundles	21.00
Mixed steel scrap	23.00
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	31.00
Unprepared	25.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

*For export add $4 dock charge.
**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

Here's what you can buy for cancer research— for $5 or $50 or $500,000!

You can give a cancer research laboratory five dozen glass culture tubes for $5, one instrument sterilizer for $50, one hundred medical fellowships for $500,000!

THERE ARE no bargains in cancer research. Hunting the cause of cancer—and ways of preventing cancer—is an exacting job. A demanding job. An *expensive* job. *It costs money.*

To give you an example, below are actual prices of equipment purchased with American Cancer Society funds. Little things, like glass slides. Massive things, like room-size total body radiation instruments. *All* vital to the fight against cancer.

So is your donation.

See what you can afford to buy. Then write that figure down on the coupon at the bottom of this page, and mail it with your contribution to CANCER, c/o your local Post Office. All gifts are tax deductible.

5 dozen tissue culture tubes $5
6 months' supply of rubber gloves $15
Food and care of 1500 mice for 1 day..... $15
1 dozen glass flasks for chemical studies $15
1 micrometer $19
1 mouth rebreathing apparatus and nebulizer.. $20
1 day's supply of radium needles $35
1 instrument sterilizer $50
1 blood cell calculator, used in leukemia studies $70
3 units of human serum $70
4 days' maintenance of a cancer research bed.. $100
1 water phantom for radiation dosage studies.. $100
1 kymograph manometer $134
100 AK mice for preparation of Coombs serum $150
1 egg incubator $150
1 constant temperature bath $200
1 isotope scanner $250
1 x-ray tube $480
2,000 millicuries of radioactive iodine $750
1 heart-lung machine for drug perfusion $2600
½ gram of cobalt 60 for radiation research.. $6000
1 grant for the study of the role of hormones in growth, including the cause, prevention and treatment of cancer.... $70,000
1 high-voltage, total body radiation instrument $100,000
100 training fellowships for 1 year $500,000
Grants to 5 scientists, each heading a cooperative 5-year research program $1,000,000

Guard your family. Fight cancer with a checkup and a check.

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Cancer
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Attached is my gift of

$_____ to fight cancer.

My name _____

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City and State _____

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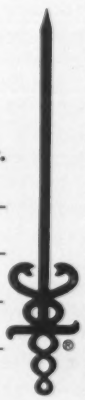
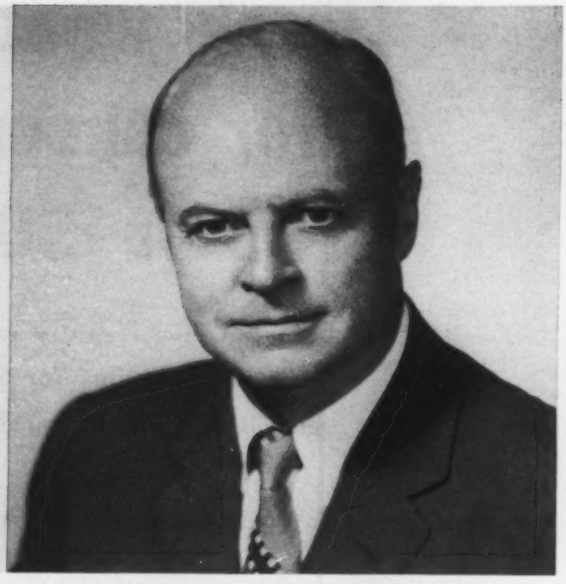
AMERICAN CANCER SOCIETY



"It is an old American custom to assume that markets in other countries will tend to follow the same pattern as did ours in attaining the same level of development. This does not necessarily hold for aluminum markets abroad. Time is being telescoped, and Europe's ability to make more progress than the U. S. since 1950 is indicative that our past is not necessarily the prologue for other areas."

John H. Krey, vice president, Reynolds Metals Co.



Aluminum Speeds Foreign Expansion

Nonferrous Metal Prices, Pages 134 & 135

U. S. ALUMINUM companies more and more are casting an appreciative eye on the hustling economies of Western Europe. They see the fast overseas growth, in the words of Reynolds' John H. Krey, as a marketing challenge which, while dwarfing the problems of the past, expands future opportunities.

• **The Lure**—Western Europe has a population of 370 million vs. 180 million in the U. S. In the two big trade groups, the Common Market (population, 175 million) and the Outer Seven (population, 94 million) there are nearly 2 million housing starts a year, and 20 million autos are on the road.

In 1950, Western Europe used only 48 per cent as much aluminum as the U. S. By the end of last year, the figure had increased to 82 per cent. Even more significant, says Mr. Krey, in the 1957-60 period, Western Europe increased its apparent consumption of primary metal by 498,000 tons, almost twice the 251,000 ton increase in the U. S. Per capita consumption in the U. S. is around 27 lb vs. about 7 lb in Western Europe. It's as high as 13.5 in West Germany.

In some markets, like certain types of containers, Europe is ahead of us, says Mr. Krey. In others, it is far behind. Example: The U. S. uses 23 per cent of its aluminum in building products; the United Kingdom, Germany, and France use only 6 per cent. Convenience foods (such as frozen and semiprepared) are not yet common in Europe.

The consensus is that aluminum demand in Europe will increase faster than the 8 per cent annual growth rate (estimated) in the U. S., says Mr. Krey. The same holds true in some other areas. Japan's aluminum consumption rocketed from 21,000 tons in 1950 to about 225,000 tons last year. Some forecasts indicate consumption of 500,000 to 700,000 tons yearly by 1970. Australian consumption climbed from 5000 tons in 1950 to 43,800 tons last year. India now takes only modest tonnages (35,000 tons in 1960) but an annual consumption rate of only 1 lb per capita would give it an annual consumption rate of more than 200,000 tons.

• **The Bait**—These markets can't be taken for granted, says Mr. Krey. ". . . the vigor with which product development and market skills are applied in the markets of Europe and Asia will dictate the rate of growth in these areas."

To take advantage of the growing markets outside this country, the U. S. industry is investing heavily overseas, usually via a tie-in with a company in the host country. Reynolds, through its affiliates and subsidiaries, operates in 11 countries. Kaiser has operations in six countries and is actively studying several other expansions and affiliations. Alcoa has manufacturing operations in seven countries. Olin is the largest shareholder in a big bauxite-to-alumina complex being developed in the Republic of Guinea. The big Canadian producer, Aluminium Ltd., the first aluminum company to take on international overtones, has wide holdings.

AT THE HEART OF THINGS

This 20th anniversary of the U. S. Savings Bonds program is an important milestone for the 45,000 companies, large and small, which offer the Payroll Savings Plan to their employees. Payroll Savings is the heart of the bond program, and the means by which millions of families have seen dreams realized since 1941. It has been good for business and industry... good for local communities... good for the nation's economic welfare. Above all it is good for the citizen who sees in each Savings Bond a share in his country's future.

If yours is one of the 45,000 participating companies, this anniversary year offers a good reason for renewed promotion. For help and suggestions, contact your State Savings Bonds Director, or write: **U.S. Savings Bonds Division, Treasury Department, Washington 25, D.C.**

U.S. SAVINGS BONDS DIVISION—
20 YEARS OF SERVICE TO AMERICA

STEEL
The Metalworking Weekly

The U. S. Government does not pay for this advertisement. The Treasury Department thanks, for their patriotism, The Advertising Council and the donor above.

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 29.00; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 31.00 deld.; custom smelters, 31.00 nom.; lake, 31.00 deld.; fire refined, 30.75 deld.

Germanium: First reduction, ingots, less than 1 kg. 36.00-37.50 per gram; 1-10 kg. 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $203-205 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb. f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $5.25 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 111.25.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime Western, 11.50; brass special 11.70; intermediate, 11.70. East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.35; special high grade, 12.50 deld. Die casting alloy ingot No. 3, 13.75; No. 2, 14.25; No. 5, 14.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.25-26.00; No. 12 foundry alloy (No. 2 grade), 21.75-22.25; 5% silicon alloy, 0.60 Cu max, 23.50-24.00; 13 alloy, 0.60 Cu max., 23.50-24.00; 195 alloy, 24.75-25.75; 108 alloy, 22.25-22.75. **Steel** deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 22.00; grade 3, 21.00; grade 4, 20.00.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.955, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof, 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; length, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 25.75-26.25; No. 2 heavy copper and wire, 23.75-24.25; light copper, 21.25-21.75; No. 1 composition red brass, 22.00-22.50; No. 1

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES d (Based on copper at 31.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	56.13b	50.61-51.36	....	57.32	27.00	27.00	26.25
Yellow Brass	49.27	34.77-35.77c	49.56	53.43	20.375	19.50c	18.50c
Low Brass, 80%	52.15	52.09	52.44	56.21	22.875	22.625	22.125
Red Brass, 85%	53.17	53.11	53.46	57.23	23.875	23.625	23.125
Com. Bronze, 90%	54.73	54.67	55.02	58.54	24.75	24.50	24.00
Manganese Bronze	57.71	51.27	61.54	....	19.25	19.00	18.25
Muntz Metal	51.94	47.25	....	....	19.125	18.875	18.375
Naval Brass	53.94	47.75	60.25	58.10	19.00	18.75	18.25
Silicon Bronze	61.39	60.58	60.68	79.80	26.375	26.125	25.375
Nickel Silver, 10%	64.83	67.16	66.91	....	25.25	25.00	12.625
Phos. Bronze, A-5%	76.97	77.47	76.72	78.90	28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 21.00-21.50; new brass clippings, 18.50-19.00; light brass, 15.50-16.00; heavy yellow brass, 16.50-17.00; new brass rod ends, 17.50-18.00; auto radiators, unsweated, 17.50-18.00; cocks and faucets, 19.00-19.50; brass pipe, 19.00-19.50.

Lead: Soft scrap lead, 7.25-7.75; battery plates, 3.00-3.25; linotype and stereotype, 8.50-8.75; electrotype, 8.00-8.25; mixed babbitt, 10.00-10.50.

Monel: Clippings, 23.00-23.50; old sheets, 22.00-23.00, turnings, 16.50-17.00; rods, 22.00-23.00.

Nickel: Sheets and clips, 52.00-54.00; rolled anodes, 52.00-54.00; turnings, 40.00; rod ends, 52.00-54.00.

Zinc: Old zinc, 3.50-4.00; new diecast scrap, 3.50-4.00; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 9.75-10.25; clean borings and turnings, 4.50-5.00; segregated low copper clips, 11.75-12.25; segregated high copper clips, 10.75-11.25; mixed low copper clips, 11.25-11.75; mixed high copper clips, 10.75-11.25.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 9.75-10.25; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 14.00; segregated high copper clips, 13.50; mixed low copper clips, 13.50; mixed high copper clips, 13.00-13.50.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 29.50; No. 2 heavy copper and wire, 27.25; light copper, 25.00; refinery brass (60% copper) dry copper content, 26.25-26.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 29.50; No. 2 heavy copper and wire, 27.50; light copper, 25.25; No. 1 composition borings, 25.00; No. 1 composition solids, 25.50; heavy yellow brass solids, 20.00; yellow brass turnings, 17.50; radiators, 21.00.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60. **Copper:** Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 109.00; 500-1999 lb, 102.00; 2000-4999 lb, 98.50; 5000-29,999 lb, 97.50; 30,000 lb, 96.50. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 500 lb, 141.00; 500-999 lb, 139.00; 1000-1999 lb, 137.00; 2000-9999 lb, 136.00; 10,000-19,900 lb, 135.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.25, ton lots.

CHEMICALS

Cadimum Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 500-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 2000 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 84.20; 100-600 lb, 74.50; 700-1900 lb, 71.80; 2000-9900 lb, 69.90; 10,000 lb or more, 68.60.

Stannous Chloride (Anhydrous): 100 lb, 141.70; 400 lb, 131.70; 800-19,900 lb, 110.40; 20,000 lb or more, 106.20.

Stannous Sulphate: Less than 50 lb, 149.40; 50 lb, 119.40; 100-1900 lb, 117.40; 2000 lb or more, 115.40.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 129)

a firm undertone and dealers are predicting that June orders will be placed by the mills at prevailing prices. Dealers hope for larger orders this month because of higher steelmaking operations.

• **Detroit** — The auto lists closed about $2 a ton higher, industrial bundles going for just under $37. Dealers report that brokers filled orders off the industrial bundles lists with the result demand for dealer bundles is limited. While prices are higher, there is a feeling of uneasiness in the market.

• **Cincinnati**—Prices are steady, and local mills are expected to enter the market this week for June delivery tonnage. Industrial lists reflect an upward price trend. The steady increase in steelmaking operations in this area has reduced the substantial scrap inventories of recent months.

• **St. Louis**—The market continues quiet. Volume is down, and brokers are expecting little change the next several weeks.

• **Birmingham** — While prices on the steelmaking grades appear strong, the cast iron grades continue weak. Structurals and plates are now quoted $42-$43, No. 1 railroad heavy melting is $34-$35, up $1, with rails (2 ft and under) $46-$47.

• **Houston**—Higher export prices in the Gulf Coast area are indicative of a steadying, firmer trend in the steel scrap market. Although exporters are not buying much tonnage, they are getting ready for anticipated June orders from Japan.

The supply of scrap in the Houston area is falling off, and it wouldn't be suprising if two district mills jumped into the market for tonnage.

Domestic prices are unchanged, with No. 1 heavy melting $35. That compares with $39-$41 quoted on material for export at Louisiana ports.

• **Seattle**—Prices declined about $3 a ton on the principal grades last week. The market reaction reflects conditions in Eastern centers and sluggishness in exports. It's reported that Japanese buyers are holding heavy inventories and not looking beyond current commitments. No. 1 heavy melting is quoted $41, No. 2 heavy melting at $38, No. 2 bundles at $27, motor blocks at $36, and electric furnace material at $45-$46.

• **Los Angeles** — Although export demand is down to a trickle, prices are fairly steady. Domestic needs continue to lag, however, and dealers report little tonnage is moving from their yards. Little change in the situation is foreseen for the near future.

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Available at a good reduction under mill price steel sheets and plates, limited quantity only, range plates 3/8", 5/16", 1/4", 3/16", any width up to 60" maximum or decimal equivalent, sheets 7, 8, 9, 10, 11, 12, 13, and possibly 14 gauge up to 60" in width, specifications per your choosing from SAE 1005 to SAE 1050, plain, pickled dry, or pickled and oiled available, depending on specifications. Can also supply coils. All material from domestic manufacture off continuous mill. Exact sizes can be supplied. Must have complete specications and delivery point so that proper quotation can be given. Prefer end-users, however, will accept serious inquiries from resellers. If interested, write:

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HYPOID—Sizes from 1½" to 28" dia.

ZEROL—Sizes from 16 pitch, 1½" dia., to 1½ pitch, 21" dia.

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Tin Can Shipments Score Sharp Gain During March

The movement of tin plate cans in March totaled 373,854 tons compared with 292,471 in the preceding month, reports the U. S. Census Bureau. The total for the first quarter was 955,075 tons vs. 921,930 in the corresponding 1960 period. In terms of base boxes of metal consumed, the total in March was 8,176,461 against 6,414,678 in February.

Shipments of fruit and fruit juice cans in March were 41,761 tons vs. 34,620 in February (base boxes of metal consumed totaled 893,690 vs. 740,860). The cumulative total for the first three months was 113,627 tons against 133,302 in the same period last year.

Vegetable and vegetable juice can shipments in March totaled 47,141 tons vs. 30,012 in February (base boxes of metal consumed were 1,008,857 vs. 642,246). The movement during the first three months this year totaled 103,318 tons vs. 84,275 tons in the same period last year.

Shipments of beer cans (largest single category) amounted to 69,204 tons in March compared with 46,606 in February (base boxes of metal consumed in March totaled 1,425,608 vs. 960,091 in February). First quarter shipments amounted to 162,083 tons vs. 154,252 in the same period last year.

Shipments of aluminum cans amounted to 2894 tons in March and 3393 in February.

Pig Iron . . .

Pig Iron Prices, Page 125

Merchant pig iron buying is expected to decline in June as many consumers anticipate plant shutdowns for vacations.

Strong export demand is one of the bright spots in the market in the Buffalo district. Shipments are being made via the St. Lawrence Seaway to Japan and Italy. There also is a fair sized movement via the Barge Canal and the Hudson River to New York for export. The movement of iron via the Great Lakes to Midwestern points also is accelerating. Merchant iron producers in Buffalo have ample stocks to cover the current flow of orders.

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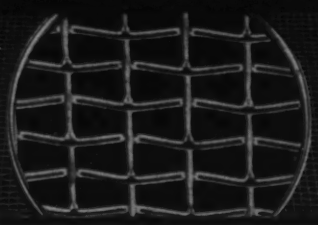

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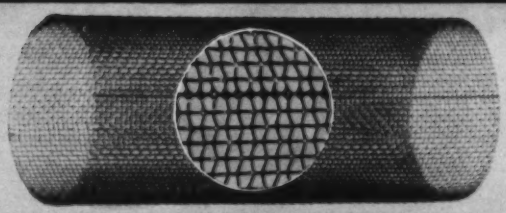

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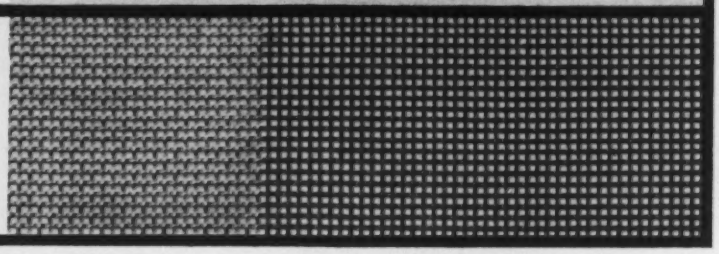

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THE CAMBRIDGE WIRE CLOTH CO.

DEPARTMENT J • CAMBRIDGE 6, MARYLAND

Manufacturers of Metal-Mesh Conveyor Belts, Flat Wire Conveyor Belts, Wire Cloth, Wire Cloth Fabrications and Gripper® Metal-Mesh Slings.

Operation: Blast Cleaning

(one of a series)

THIS CASTING TOOK

15 MINUTES TO CLEAN . . .

THIS ONE ONLY 4 MINUTES

WITH **ROTOBLAST**

No two ways about it: Rotoblast equipment cuts cleaning costs, sometimes by as much as 70%. Hundreds of manufacturers have improved their profit picture — as well as their quality of cleaning — with Rotoblast because it reduces manpower—up to 75% . . . works faster, up to 50% faster for straight through processing ...requires much less maintenance...reduces down-time.

Whether it is a small Rotoblast barrel or a giant tableroom, you'll find that the day you start using Rotoblast is the day your cleaning costs start to come down. And you'll get additional cleaning economies with the use of solid, tough, Rotoblast Steel Shot and Grit. To get the full story, write:

Pangborn

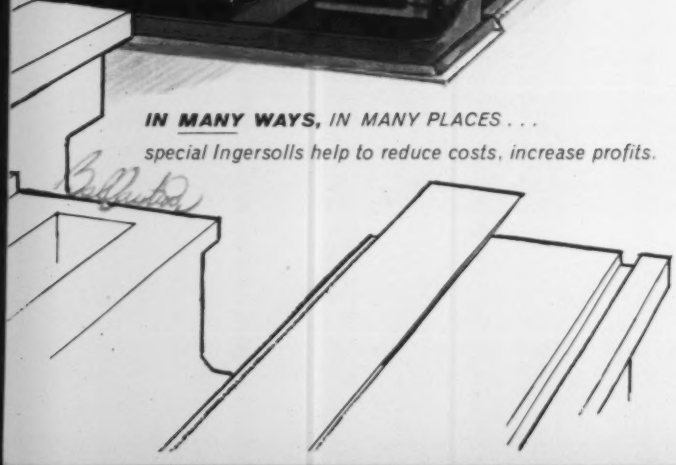
OF HAGERSTOWN

PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md.; Pangborn Canada Ltd., 47 Shaft Rd., Toronto (Rexdale), Canada;—Manufacturers of Blast Cleaning, Vibratory Finishing, Dust Control Equipment—Rotoblast® Steel Shot and Grit®.

THE INGERSOLL MILLING MACHINE COMPANY ROCKFORD, ILLINOIS

***IN MANY WAYS,** IN MANY PLACES . . .*

special Ingersolls help to reduce costs, increase profits.



Accuracy is the chief ingredient of profit in building precision machine tools such as DeVlieg Jigmils. The special Ingersoll pictured here—biggest machine in the new DeVlieg plant at Detroit—paces the entire shop by repeatedly and dependably producing large parts to exacting tolerances.

Costs are reduced and deliveries to DeVlieg's customers are speeded because time is saved both at the machine and on the assembly floor. The machine's cutting capacity, coupled with good work methods, precision Ingersoll tools and tool grinding equipment, has eliminated many machine hours. Its accuracy has eliminated many hours of hand finishing.

There are other gains—highly significant though less readily evaluated: Reduced setups and handling time . . . reduced indirect labor hours . . . reduced crane demands . . . reduced inventories of work-in-process.

The machine's true profit making ability is the sum of all these savings.